Regional Australia – Redefining the Future
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Harnessing Data to Support Regional Development:
An Australian Case Study

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Harnessing Data to Support Regional Development:
An Australian Case Study

ABSTRACT: As economic, environmental and demographic pressures are placed on our rural and regional communities, there is need for ambitious approaches to provide data and analytical tools to support smart regional growth and planning. This paper introduces the Australian Urban Research Infrastructure Network (AURIN) that is currently enabling a network of researchers, planners and policy-makers from across Australia in evidence-based decision-making, via access to an online workbench of data and tools. The workbench comprises of over 1,300 datasets, over 100 spatial statistical routines, and a select number of planning support systems and geodesign tools. We outline the data and analytical capability the online workbench; introduce some of the PSS tools and spatial statistical capabilities through a case-study approach that can be applied to the Australian regional context. We also discuss the user outreach and capacity building capability program that is a critical component to assist with user adoption. We conclude with some thoughts and suggestions on how previously urban-focused research programs can be re-prioritised to support excellent decision making in our peri-urban, regional and remote communities.

Keywords: federated data, spatial statistics, regional planning support systems, industry clustering, functional economic regions

Introduction
Australia faces unique challenges in developing our regional areas to best maintain equitable outcomes socially, economically and environmentally. As the country is rapidly urbanising, many dynamics are coming into play in regional areas regarding the proper provision of services including health, education, employment, and community development (Dobrow, Goel, & Upshur, 2004; Horridge, Madden, & Wittwer, 2003). These issues are frequently politicised, yet are underpinned by accountable and measurable metrics that, when drawn together, form an evidence-base that can be communicated to better inform and predict likely outcomes of decisions (Marston & Watts, 2003). This evidence base can support better decision-making and provide compelling propositions that may serve to help communities better design their physical environments and manage the socio-economic dynamics that often require well-targeted resource allocations within tight constraints.
Several challenges exist for regional researchers and decision-makers in gathering supporting information and data. Often data sources are dispersed across many custodians and their discoverability is limited. Furthermore, analysing this data in a site-specific way has required specialised skills, tools and methods. Because of these challenges, useful information has either been scarce, or expensive to curate and maintain over time.

The Australian Urban Research Infrastructure Network (AURIN) connects networks of researchers, planners and policy-makers from across Australia with over 40 data custodians.\(^1\) The AURIN portal provides a secure, online platform to access big data, to facilitate the integration of diverse types and sources of data, and to enable the real-time interrogation of data using a sophisticated suite of open source statistical, spatial analytical, modelling and visualisation tools. This national framework is harnessing Census data from the Australian Bureau of Statistics (ABS), property transactions from Australian Property Monitors (APM) and street networks from the Public Sector Mapping Agency (PSMA) to name a few custodians providing comprehensive coverages of high-quality spatial data. Groups such as the Public Health Information Development Unit (PHIDU), National Centre for Economic Modelling (NatSEM) and the Centre for Full Employment and Equity (CofFEE) also provide micro-simulated data that reveals fine-grain and validated estimates for small areas of human habitation spanning the country’s coastal and inland cities, towns and remote communities. These datasets, combined with specific data sourced from local organisations and individuals can be combined and visualised to reveal patterns and trends that are easily mapped, communicated and assessed for further developments. Importantly these methods can not only identify well serviced areas, but also highlight areas that are under-serviced and provide a compelling case to lobby and advocate for a better allocation of resources and services (Dreisinger et al., 2008; Pullin & Knight, 2003). At present there are over 1300 national, regional and local datasets accessed via the AURIN portal (illustrated in Figure 1), together with over 100 analytical and visualisation tools.

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\(^1\) See [http://www.aurin.org.au](http://www.aurin.org.au) Last accessed 18/07/2015
Evidence-based decision making

Data is synonymous with evidence: it can be collected and presented to a group of decision makers or the broader community to verify its quality and either accept or reject it as suitable for consideration in terms of its authority, timeliness and comprehensiveness. Additionally, methods used to interrogate data are by their nature replicable, which ensures that the conclusions drawn from data are testable and falsifiable by other investigators. These principles underpin the data retrieval and analytical processes within the AURIN portal. Consequently, while there are no specific requirements about the type of data sources that are included within the AURIN portal, other than that they be geospatial (reflecting the federated nature of the project), AURIN maintains a robust metadata standard, ensuring comprehensive information about how and when the data were collected and transformed (and by whom). This allows users to evaluate the appropriateness of the data to their research goals and to make their own informed decisions regarding its use. Licensing information is also provided within the metadata, which ensures that researchers are aware of the limitations of the use of the data, and the terms and conditions that come from its use. Moreover, comprehensive information regarding the use of the portal’s tools are maintained at a companion
documentation site (Figure 2), ensure that users are aware of the statistical and methodological constraints for the suite of the tools, the appropriate conditions for their use, and guides on how to replicate the results.

Figure 2: Example of the documentation for analytical tools within the AURIN portal.

By providing the workbench to a broad range of stakeholders who design and plan our cities, it is also anticipated that new collaborative outcomes will foster multidisciplinary research to inform the future of human settlements in Australia, rural, regional and urban (Barton, Goldie, & Pettit, 2014).

In this paper we focus on the Albury-Wodonga area as a case study. This area is a regional hub, and essentially operates as a single economic unit, supporting a range of industries. The area spans two different states, adding to the challenges of data sourcing from multiple organisations and management authorities. We demonstrate a series of examples in which triple-bottom-line data (economic, social and environmental) can be sourced, processed, analysed and mapped; and in turn the outputs of these exercises are compared to each other to give a better understanding of the area as a whole in both its regional and national context.
We conclude by noting any problems encountered and provide a discussion for future directions and applications.

**Albury-Wodonga and Functional Economic Regions**

The cities of Albury and Wodonga, spanning the New South Wales and Victorian borders respectively, have a combined population of 87,890 (ABS, 2015), and constitute substantial regional centres for both states. While spanning different political jurisdictions (states) the cities effectively function as a single economic unit, with considerable capital and labour movements across the state boundaries between the two localities. This transcendence across state and territory boundaries is not unique to the Albury-Wodonga centre, with similar situations arising at Canberra-Queanbeyan (ACT-NSW) and Coolangatta-Tweed Heads (QLD-NSW).

The economic linkage of Albury and Wodonga across *de jure* boundaries presents substantial challenges for researchers attempting to understand and quantify the economic, social and environmental processes occurring within the region as a whole. This is due to the nature of the statistical geographic standards developed by the Australian Bureau of Statistics, which rely on a hierarchical aggregation of areal units up to and including states. The imposition of boundaries which may not reflect underlying spatial processes is bound up with the concept of the modifiable unit problem, MAUP (Wong, 2009), which has implications for conclusions drawn from statistical analysis undertaken thereon, including the effects of spatial autocorrelation (Anselin, Bera, Florax, & Yoon, 1996; Arbia & Petrarca, 2011).

Considerable research has been undertaken in order to deal with these issues and their impacts on evidence-based decision making, particularly with respect to econometric analysis (e.g. Menon, 2012). In Australia, the imposition of jurisdictional boundaries has led to the development of an entirely novel, bespoke set of economic geographies, known as *Functional Economic Regions (FERs)*, developed by the Centre for Full Employment and Equity (CofFEE) at the University of Newcastle, in order to remove the impact of spatial autocorrelation on econometric methods (Mitchell, Stimson, & Dalziel, 2010). These geographies are fully implemented within the AURIN portal, allowing researchers to work independently of jurisdictional boundaries to more fully understand the processes at work in this regional milieu.
**Economic Analyses**

We begin by investigating the economic and employment characteristics of the Albury-Wodonga FER within the context of the other FERs across the country. In particular, we undertake a *Location Quotient (LQ)* analysis of employment (Full Time Employment) and labour (Labour Force Participation rate) statistics from 2011 for the region, which have been aggregated to FER boundaries. Location Quotients allow us to investigate how much higher or lower particular variables are for specific regions, compared to a larger area (in this case, the rest of Australia). The LQ is given by the following formula

\[
LQ = \left( \frac{\frac{p_i}{P_i}}{\frac{p_n}{P_n}} \right)
\]

Where \(p_i\) represents the count of variable \(p\) in spatial unit \(i\), \(P_i\) represents the total population \(P\) in spatial unit \(i\), \(p_n\) represents the count of variable over the entire dataset, and \(P_n\) represents the total population over the entire dataset. LQ values underneath 1 represent areas or units where the proportion or rate of a variable is below the total average, while values above 1 represent areas or units where the proportion or rate of the variable are above the total average. In this case, the variables are full time employment and labour force participation numbers within *FERs*, while the total population counts in both instances are working age individuals within *FERs*.

We undertake this analysis within the AURIN portal, which contains economic and labour force data aggregated to FER, produced by CoFFEE. In addition, the *LQ* analysis is part of the suite of analytical tools, implemented in the *R* statistical language (R Core Team, 2014), and carried out on the *NeCTAR* cloud-computing system. Figures 3 and 4 show the outputs of the *LQ* analyses for the FERs, with the Albury-Wodonga FER highlighted in both instances. Figure 3 shows that the 2011 full time employment (FTE) rate within the Albury-Wodonga FER was below the national average, at 0.939 of the Australian FTE rate, placing it in the 0.75-1 range shown on the map. By contrast, Figure 4 shows that the 2011 labour force participation (LFP) rate within the Albury-Wodonga FER was considerably higher than the national average, with a LFPR 1.638 times higher than the Australian LFP rates for the same period.
Figure 3 illustrates the LQ values for full time employment rates across FERs, with the Albury-Wodonga FER highlighted. This indicates that the 2011 FTE rate within the Albury-Wodonga FER was below the national rate.

Figure 4 shows the LQ values for LFP rates across FERs, with the Albury-Wodonga FER highlighted. This indicates that the 2011 LFP rate within the Albury-Wodonga FER was above the national rate.
The analyses above provide economic information about the Albury-Wodonga region within a national context. However, geographers, decision-makers and policy analysts are often interested in how social, economic and environmental measures may vary within a region. We will examine more economic data within the Albury-Wodonga region. In particular, we will again look at the distribution of LFP rates with respect to a measure of socio-economic disadvantage, this time at the Statistical Area Level 2 (SA2) level. The AURIN portal allows the user to undertake this more granular level of analysis, again in a way that can overcome the boundaries imposed by states, by using the Bounding Box area selection. In this instance, we specify a region that we are interested in accessing data around, by placing a bounding box over the Albury-Wodonga area (Figure 5); thus when we search for data from the federated custodians, all datasets at all levels of aggregation are available for shopping.
For this analysis, we accessed two datasets: *SA2 Summary Measure of Disadvantage* produced by the ABS and accessed via PHIDU at the University of Adelaide; and *SA2 OECD Indicators: Unemployment Rates 2011* produced at NATSEM. The former is shown mapped across our study area in Figure 6, indicating that there is a disparity between Albury and Wodonga with respect to the levels of socio-economic disadvantage characterising the two areas. The Index of Relative Disadvantage (IRSD) score of 966 for Wodonga is below 1000, the normalised Australian average. By contrast, the IRSD score for Albury is 1044, above the Australian average. This provides some important subregional evidence about the potential disparities characterising the region.

Figure 6 shows socio-economic disadvantage, represented by the Index of Socio-Economic Disadvantage (IRSD) mapped at the SA2 level across the study region. This map indicates a disparity between Albury and Wodonga with respect to the levels of disadvantage characterising the areas.
Users can combine datasets within AURIN, including those from very different custodians in order to be able to understand some of the complex interactions between social, economic and environmental processes and patterns. In this workflow, we combine the SA2 Summary Measure of Disadvantage and SA2 OECD Indicators: Unemployment Rates 2011 and undertake a correlation analysis, examining the relationship between unemployment rates and disadvantage within the study region. The results of this correlation analysis are shown in Figure 7. These outputs are in simple text format, allowing for an easy copy and paste into the users’ reports or research outputs. The results indicate that the only employment rate that correlates significantly with disadvantage within the study area is the employment rate of males aged 25-44 (r = -0.3112, P<0.05).

Figure 7 shows the outputs of correlation analysis between rates of unemployment and index of disadvantage across the study area. All unemployment rates had a negative correlation with the index score (indicating that they decreased as the index score increased, i.e. as disadvantage decreased), shown in the top red box. However, the bottom red box indicates that only the Male 25-44yo unemployment rate correlation was statistically significant.
Industry Clustering

ABS job counts can be categorised in accordance to the Australia New-Zealand Standard for Industry Classification (ANZSIC) codes and attributed to Destinations Zones (DZN). These zones are where Census respondents list their place of work to be, and their self-assessed profession/industry.

Table 1 charts the resulting employment numbers by top-level ANZSIC classifications for industry across the Albury and Wodonga LGAs, and separates counts from Albury (NSW) and Wodonga (VIC). The DZN figures have been aggregated up to the LGA level.

As of 2011, the largest employer, across the two areas combined is Category Q: Health Care and Social Assistance (15%). This is followed by Category C: Manufacturing (13%) and Category G: Retail trade (13%). Within the Wodonga LGA alone, Manufacturing accounts for 17% of jobs of the total 15,578 in that LGA. Albury provides 20,480 jobs, bringing the total jobs for the two combined LGAs to 36,058. Note that this figure represents destination zones and as such represent a combination of endogenous and exogenous employment for the locality and region (Stimson, Stough, & Nijkamp, 2011).
Table 1: 2011 Employment counts for Albury LGA and Wodonga LGA, by ANZSIC code. Source: ABS, 2011

<table>
<thead>
<tr>
<th>CODE</th>
<th>ANZSIC CLASSIFICATION</th>
<th>Albury (NSW)</th>
<th>Wodonga (VIC)</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A000</td>
<td>Agriculture, forestry, fishing and hunting</td>
<td>140</td>
<td>115</td>
<td>255</td>
<td>1%</td>
</tr>
<tr>
<td>B000</td>
<td>Mining</td>
<td>13</td>
<td>21</td>
<td>34</td>
<td>0%</td>
</tr>
<tr>
<td>C000</td>
<td>Manufacturing</td>
<td>1926</td>
<td>2596</td>
<td>4522</td>
<td>13%</td>
</tr>
<tr>
<td>D000</td>
<td>Electricity, gas and water supply</td>
<td>157</td>
<td>134</td>
<td>291</td>
<td>1%</td>
</tr>
<tr>
<td>E000</td>
<td>Construction</td>
<td>1362</td>
<td>944</td>
<td>2306</td>
<td>6%</td>
</tr>
<tr>
<td>F000</td>
<td>Wholesale trade</td>
<td>763</td>
<td>527</td>
<td>1290</td>
<td>4%</td>
</tr>
<tr>
<td>G000</td>
<td>Retail trade</td>
<td>2820</td>
<td>1760</td>
<td>4580</td>
<td>13%</td>
</tr>
<tr>
<td>H000</td>
<td>Accommodation, Food Services</td>
<td>1729</td>
<td>689</td>
<td>2418</td>
<td>7%</td>
</tr>
<tr>
<td>I000</td>
<td>Transport and storage</td>
<td>808</td>
<td>747</td>
<td>1555</td>
<td>4%</td>
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<tr>
<td>J000</td>
<td>Information Media and Telecommunications</td>
<td>258</td>
<td>162</td>
<td>420</td>
<td>1%</td>
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<tr>
<td>K000</td>
<td>Finance and insurance</td>
<td>588</td>
<td>268</td>
<td>856</td>
<td>2%</td>
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<tr>
<td>L000</td>
<td>Rental, Hiring and Real Estate Services</td>
<td>343</td>
<td>163</td>
<td>506</td>
<td>1%</td>
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<tr>
<td>M000</td>
<td>Professional, Scientific and Technical Services</td>
<td>1030</td>
<td>633</td>
<td>1663</td>
<td>5%</td>
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<tr>
<td>N000</td>
<td>Administrative and Support Services</td>
<td>454</td>
<td>448</td>
<td>902</td>
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<tr>
<td>O000</td>
<td>Public Administration and Safety</td>
<td>1975</td>
<td>2026</td>
<td>4001</td>
<td>11%</td>
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<tr>
<td>P000</td>
<td>Education and Training</td>
<td>1758</td>
<td>1436</td>
<td>3194</td>
<td>9%</td>
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<tr>
<td>Q000</td>
<td>Health Care and Social Assistance</td>
<td>3328</td>
<td>2200</td>
<td>5528</td>
<td>15%</td>
</tr>
<tr>
<td>R000</td>
<td>Arts and Recreation Services</td>
<td>171</td>
<td>126</td>
<td>297</td>
<td>1%</td>
</tr>
<tr>
<td>S000</td>
<td>Other Services</td>
<td>857</td>
<td>583</td>
<td>1440</td>
<td>4%</td>
</tr>
</tbody>
</table>

**TOTAL EMPLOYMENT** | 20480 | 15578 | 36058

DZN figures can be granulated to mesh block level concording to general land use zones to provide a finer indication of where employment is clustered spatially. This can be modelled using finer-grain zoning underlays, removing non-employment parcels such as (residential and parkland) and using a concordance table to link employment type to remaining land use zones (Day, Sturup, & Chen, 2013). In this case, we are using two separate planning underlays; one from New South Wales and one from Victoria. As such, discrepancies are expected to arise due to harmonisation issues, small geographic catchments and potentially lossy algorithmic processes. As such, the output of this analysis is to be treated as diagrammatic rather than a statistically rigorous tool. To do this, we will use the industry clustering tool in the AURIN portal.² This tool takes advantage of cloud-based processing and provides the user with a series of assignable parameters. The tool lends itself to

generating successive iterations where the user can tweak parameters to best reveal spatial patterns and homogenous clusters.³

Figure 8 shows the land use zoning underlay for this analysis. The ABS mesh blocks contain a field that identifies the predominant land use category for the parcel. You can see Albury has a town centre of commercial use with a grid street structure. Wodonga has a strip of industrial land use across its northern edge. The towns are surrounded by parkland and rural property. Each of these Mesh blocks have been processed to contain employment numbers by top-level ANZSIC codes.

Figure 8: Land use zoning by mesh block for Albury-Wodonga (not to scale). Source: ABS 2011

It is possible to view each industry’s employment numbers thematically and individually, however the dynamic between different industries plays an important role in determining if a precinct is largely heterogeneous or contains complimentary clusters of industry. Figure 9 presents an initial comparison of some rudimentary, predictable metrics to orientate the viewer and verify the authenticity of the base data. We have compared the number of persons

³ The Australian Business Registry hold unit-level business data that may be combined with the ABS data to provide an even finer representation of economic activity in an area.
employed in agriculture with persons in manufacturing. As we are focusing on the townships for Albury and Wodonga, we can expect there to be few people employed in Agriculture and many employed in Manufacturing. Figure 9 shows 4 clusters. Cluster 1 contains a small number of employees in both agriculture and manufacturing. Cluster 2 has zero agriculture and 2020 persons employed in manufacturing. This cluster matches the industrial land parcels illustrated in Figure 8. Cluster 3 has 58 persons employed in agriculture and none in manufacturing. Similar the Cluster 2, cluster 4 is wholly manufacturing, but is identifies as a distinct cluster due to its spatial location. The clustering routine used a Wards algorithm to create 4 clusters with distinctive spatial and non-spatial (job count) characteristics.4

Figure 9: Industry Clusters of Agriculture (Category A) and Manufacturing (Category C)

Two major employers in the district are Public Administration/Safety and Health Care/Social Assistance. Figure 10 illustrates the clustering of these two sectors, revealing some noticeable patterns- the Albury town centre has a concentration of Public Administration/Safety employees (Cluster 4) and is surrounded by jobs in Health Care/Social Assistance (Cluster 3). Wodonga has a distinct cluster in the town providing Health Care/Social Assistance positions (Cluster 1), and has a series of satellite precincts with predominantly Public Administration/Safety jobs (Cluster 2).

4 See https://en.wikipedia.org/wiki/Ward%27s_method Last accessed 18/07/15
Figure 10: Clusters of Health Care and Social Assistance (O) and Public Admin and Safety (Q)

Figure 11 illustrates what might be two symbiotic sectors, Information Media/Telecommunications and Professional, Scientific/Technical Services. The results show that, although the job numbers are not as high altogether in Information Media/Telecommunications, there are several contiguous precincts where the professions share space in clusters. Some clusters sway toward one sector with a small component of the other, for instance Cluster 1 in Wodonga is largely Information Media/Telecoms, and Cluster 4 in the Albury town centre is predominantly Professional, Scientific and Technical Services.

Figure 11: Information Media/Telecoms (J) and Professional, Scientific/Technical Services (M)
Figure 12: Clusters of Art/Recreation Services (R) and Information Media/Telecommunications (J)

Figure 12 shows clusters of two of the smaller sectors in the region: Arts/Recreation Services and Information Media/Telecommunications. These are largely clustered in peripheral areas or concentrated in smaller enclaves.

This economic clustering analysis is useful to reveal the existing snapshot of employment—how sectors are spatially composed and interrelated, plus how smaller sectors are clustered at a point in time. These snapshots are useful in testing the impact of policy over time.

**Land-Use Planning**

As an example of a ‘wicked problem’, planning concerns often conflict with socio-economic motivations. A wicked problem typically has many stakeholders with competing motivations and the resolution of the semi-structured problem requires multi-partite negotiation in order to arrive at an optimal outcome— or one with the least amount of compromise for each party (Rittel & Webber, 1973).

To navigate these problems, the underlying data must be agreed upon by the stakeholders as credible and valid. Putting this data together, stakeholders are provided with the information with which to base their decisions, and then work at the knowledge level to negotiate consensus. To generate future scenario projections, we can use series of extended tools to run predictive analyses and scenario evaluations.

The *What-if* tool (Pettit et al., 2014) provides a Multi-Criteria Evaluation (MCE) environment to bring underlying datasets together into geospatial environments, and prompts each of the dataset be broken down into sub-criteria that may be designated with a weighted importance.
ranging from hard-constraint to 100% compliant. The tool then processes these weighted
criteria to output a map-based visualisation indicating the suitability of land parcels subject to
the pre-defined parameters. Importantly, this tool facilitates iterative processing and scenario
testing to encourage stakeholders to base their discussions on evidence-based information and
to reveal and focus on areas that require attention due to conflicting land-uses or contestable
juxtapositions.

ENVISION/ESP are two more tools that provide multi-criteria inputs and can then present
group of stakeholders different scenarios in a three-dimensional web-based environment with
quantitative triple-bottom-line outputs in tabular form. The impact of zoning changes can
instantly be seen and evaluated within the information-rich built context (Newton & Glackin,
2013).

Discussion
These web-based tools are flexible and deployed with moderate ease and speed. Their
technical accessibility provides the opportunity for local training and up-skilling. As such,
these geospatial tools are positioned to act as technical enablers for localised economies to
gain better data connections and strategic decision support. Planning and Infrastructure
development decisions require the consideration of may different criteria to best deliver not
only favourable economic returns on investment, but extend to flow-on effects socially and
environmentally for employment generation, service provision, and sustainable development
for existing and planned regional economies.

A substantial challenge still remains in sourcing harmonised and timely data from diverse
custodians, and maintaining the integrity of this data though shared usage. In the process of
writing this paper, it became apparent that the land use categories in the Mesh blocks were
sufficiently broad to result in overmapping or undermapping the relationship between land
use categories and ANZSIC codes when disaggregated from DZNs. Furthermore, the simple
process of joining geometries for the two states generated topology errors that needed
cleaning before the analytical tools could complete their processes.

We have seen from the foregoing real world examples that AURIN as a significant national
infrastructure is an important ‘next-step’ towards embedding data, analytic tools,
visualisation models and predictions into the development of our regions and cities.
Adding further impetus to the data and analytical capabilities challenge is the widely held
view that regional cities and major capital cities alike are systems of systems, increasingly
interconnected with highly integrated functions and infrastructure such as transport, business
and energy systems, or electrical power, telecommunications and financial systems. While a systems view of cities and regional development may increasingly drive contemporary policy and design planning; at its heart is the accelerating deluge of data relating to every aspect of our daily lives, popularly known as ‘Big Data’. Driven in large part by cumulative digitisation and progressive capture of information, ‘Big Data’ in the context of development of the modern city, communities and regions can present more reliable methods to plan for and achieve socially cohesive communities, wealth creation and dramatically improved labour force productivity. ‘Big Data’ has become one of the most talked about phenomena in the hard sciences. Indeed the mountains of data continue to grow exponentially because of pervasive Internet-based technologies, the rise of state based ‘Open Data’ initiatives and the principle of ‘Creative Commons’. However the nub of the big-data problem is the inverse relationship between growing data volumes and efficient analytics available to convert that data into meaningful information or knowledge for the purposes of intelligent decision making.

**Conclusion**

Over the last decade, great advances have been made in algorithmic data mining, agent-based modelling, large scale simulation models and machine learning. For regional and city planners, geographic information systems and geo-spatial mapping are introducing intelligent systems design methods.

Significantly however, the problem for State, Territory and local governments and their urban and regional planners still remains. Despite the availability of myriad individual techniques and methods with which to understand and visualise data, impediments to speed the quality and pace of decision-making at a system level abound. Common factors include:

- A lack of integrated access to statistical analysis techniques or broad based capabilities for harnessing their use
- Tools to fuse large scale disparate datasets and geo-spatial data in particular
- The management problem - a general lack of awareness and expertise at senior executive levels to motivate the need for a turbocharged data-analytics strategy, or embracing a top-team data driven mind set and related efforts to identify and break down information silos.

From the standpoint of regional Australia, there are emerging opportunities to understand and calibrate the interdependencies between, productivity and infrastructure investment, economic growth and social progress.
The Commonwealth Government has widely discussed the five industry pillars that play to
Australia’s strengths and have the most potential for growth:

- food and agribusiness
- resources and energy
- tourism and hospitality
- international education
- health care, medical research and aged care.

These form anchor points for Australia’s continued regional development and form a
framework for planning and managing aspirational projects such as the proposed Northern
Australia development strategy.

AURIN’s national eResearch infrastructure provides a state-of-the-art single point of access
to policy analysts and researchers and potentially, the vast eco-system of private sector
specialists in domains as disparate as engineering and primary health care.

Revitalised regional development in Australia now has the opportunity for a fast start through
seamless and secure access to data across each of the above five industry pillars, with many
datasets available through the AURIN platform. In addition to the diverse sources of data
researchers and analysts can now avail themselves of AURIN’s on-line capability to integrate
data, and interrogate data using open source statistical and spatial analysis, modelling,
scenario planning and visualisation tools all embedded within the AURIN platform.

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Identifying the Strengths, Weaknesses, Opportunities and Threats for Regional Cultural Tourism using the Gold Coast, Queensland, as a Case Study

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ABSTRACT: Internationally, heritage can be a major drawcard for tourists although often even inventories of local heritage are weak. For example, the key findings in respect of heritage from the ‘State of the Environment Report 2011’ (Department of Environment, 2011), an independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities concluded that there was still a need for ‘thorough assessments that lead to comprehensive natural and cultural heritage inventories’. Without even a comprehensive inventory of local heritage, presenting and advertising the cultural heritage of a region will fall short. As a consequence, the benefits of cultural tourism in the regions, together with the associated income, cannot be maximised. Using the Gold Coast, Queensland, as a case study we present a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of cultural tourism and provide recommendations for regional development in Australia.

Keywords: Australia; cultural heritage; Queensland; regional development.
Introduction

Internationally, tourism accounts for approximately 10 per cent of gross domestic product (Blamford et al., 2009) and it has been increasingly recognised by researchers and policy makers for its economic value (Choi, Ritchie, Papandrea & Bennett, 2010). Indeed, heritage tourism was considered the ‘buzz word of the 1990s’ (Herbert, 1995) and regarded as one of the most significant and fastest growing components of tourism (Alzua, O’Leary & Morrison, 1998). Others (e.g. Poria, Butler & Airey, 2003; Zeppel & Hall, 1991; Zeppel, Hall & Weiler, 1992) also considered that within the special interest tourism market, culture and heritage typically contributed to the appeal of tourist destinations (Zeppel et al., 1992) and was experiencing ‘major’ growth. However, despite the ‘buzz’, Zeppel and Hall (1991) acknowledged that there has been limited focus given to the phenomenon. Within the Australian context, Brokensha and Guldberg (1992) suggested that cultural tourism was an increasingly popular attribute of domestic and overseas tourism. However, despite being frequently acknowledged and even considered in the context of the ‘cultural economy’ of regional areas (e.g. the ‘bongo fury’ of Byron Bay, New South Wales; Gibson & Connell, 2003) there appears to have been a general lack of integration into the management process of the values and significance of heritage resources (Carter & Bramley, 2002). For example, there is even a lack of clear definition around what may be termed cultural tourism (Poria, Butler, & Airey, 2001; Garrod & Fyall, 2000, 2001; Weaver, 2011).

This lack of focus on this important area of tourism (Weaver, 2011) intrigued us and so we decided to investigate further. In this paper, we used the Gold Coast, Queensland, as a pilot study to consider how cultural tourism may be enhanced in this regional context.

Methodological approach

We invited a group of Bond University academic planners, environmental managers and valuers to join us in a SWOT analysis to determine the strengths, weaknesses, opportunities and threats involved in enhancing cultural tourism on the Gold Coast. The focus group was managed as an informal meeting and conducted over a working day lunch period. In total 15 individuals contributed to the group discussion. Comments were recorded and the results are presented and discussed in this paper.
Results and Discussion

Strengths

One of the major strengths of the Gold Coast was seen to be that it was ‘a tourist resort [and] it is … an example of mass tourism’. The Gold Coast was perceived as ‘fast paced’. This was considered to be in direct contrast to its nearest coastal competitors for the tourist dollar, the Sunshine Coast (Noosa; ‘chill’, ‘green’), and Northern New South Wales (Nimbin, Byron; ‘green’). However, although the Gold Coast has developed from villages along the coastline (e.g., Surfers Paradise, Southport, Burleigh, Coolangatta; Hundloe & Page, 2015), as acknowledged within the focus group, the Gold Coast is now embraced as a single city. In contrast, while the Sunshine Coast has a similar ribbon development that has grown out of previous small villages, it was perceived that Noosa continues to be perceived as one of the original villages. This more holistic perception of the Gold Coast as a coastal city that spans more than 60 km of coastline, reinforces the perception that it is a mass tourism resort that was likened by the group to Waikiki (Hawaii) and Costa del Sol. This perception could be further exploited to further develop heritage tourism within the city.

Other strengths of the Gold Coast as a tourist destination were perceived to be its ‘rapid development during the 1980s’ that led to opportunities such as ‘employment … liveliness, variety and multi-culturalism that differentiated it from other areas of Queensland’. The current transiting from a perceived centre of ‘sex business’ to a ‘sporting destination’ was also considered a modern-day strength of tourism. However, the rapid expansion of the ribbon development along the coast that expanded the Gold Coast greatly as a tourist destination from the 1950s through the 1960s, with the associated slease of the ‘strip’ image, and increase in numbers of motels and guesthouses provide a fascinating glimpse into history. While much of the early infrastructure has been lost, there are sufficient echoes of this past to capture the era of this part of the Gold Coast’s history. For example, the motel that became synonymous with the Gold Coast’s racy image during the period, the Pink Poodle, has been replaced by a high rise hotel complete with the neon sign from the former Pink Poodle (Armitage & Burgin, 2015) and, along with other buildings, infrastructure, cemeteries and archaeological sites, gardens and urban precincts, this sign and thus the motel that previously advertised the original motel, has entered into Gold Coast heritage history with its inclusion in the Gold Coast Local Heritage Register (City of Gold Coast, 2015). Together with other paraphernalia of the time, including the remaining bathing pavilions now used by local
government for an entirely different purpose, an exciting tourism experience could be further developed around such heritage experiences. There is also substantial unique heritage associated with the indigenous culture and historic villages such as Southport, Burleigh Heads, Coolangatta for example being examples of the pre-tourism era of the Gold Coast that could be developed as segments of the heritage tourism of the Gold Coast. More recent developments that demonstrate the ‘power of the development industry’ – for example the in suburb of Robina – provide a unique insight into the recent heritage and on-going development of the Gold Coast that potentially provide part of an historic profile of heritage in the City.

Weaknesses

Major potential strengths of a city’s heritage profile may also be disguised by its weaknesses. For example, while the Gold Coast City Heritage List has an ‘interesting and quirky listing of heritage items [including] trees, neon signs and the historic villages [now incorporated seamlessly into the Gold Coast] of Southport, Burleigh Heads and Coolangatta’ there is much to achieve to maximise this history as diverse contributions to components of the tourist attractions. Although recognising that some of this history of these villages has a profile, members of the Focus Group considered that the potential of these original villages of the Gold Coast had also not been exploited to their full potential and that this was a weakness in terms of heritage tourism of the City. For example, it was suggested that much of the heritage of the Gold Coast was either hidden or unknown. For example, several asked if there were still Bathing Pavilions in existence and, if so, where were they. Another member of the Focus Group inquired as to whether the original railway station was associated with Jubilee Bridge while others asked ‘where is that?’ Since those who were members of the Focus Group all had strong connections with the Gold Coast, it can be assumed that such heritage is not well publicised, even locally.

Another historical factor that was seen by the Focus Group as a current major weakness of heritage tourism on the Gold Coast was that the City spans the States of Queensland and New South Wales. As a consequence, the greater diversity and complexity of management practices between governments at both state and local level was introduced with different approaches to management. These differences extended even to basic as building codes and allocation of resources and sometimes even were different on different sides of the same
street in Coolangatta and Tweed Heads. The differences in management practices between
the two states, also results in local government and state heritage controls within, even the
same street, potentially being considered differently. For example, one interesting and quirky
outcome of this is that in 1859 when the separation of the area between two states was
achieved, even some buildings in Coolangatta and Tweed Heads were split between states.
The management of heritage is, however, even more complex than simply being split
between two states. Cross State heritage management bodies also have to deal with three
levels of government where only at the Federal level are they under the same legislation. At
the other two levels (state and local governments) decisions are made by entirely different
jurisdictions and, particularly associated with local government, the legislation to guide
listing is weak.

An outcome of the weakness of the heritage legislation is probably largely due to most
people’s not recognising that heritage is not simply about old buildings of European heritage.
Indeed in this respect, unlike the cities of Europe, and even by the standards of many of the
major cities of Australia of which the Gold Coast is the sixth largest, it has no outstanding old
mansions, cathedrals or other historic European heritage sufficient to attract tourists. The
reason for this lack of ‘traditional’ European heritage attractions is that the Gold Coast is a
young city although this is not reflected in an overt presence of indigenous culture. The
growth of the city was also effectively unplanned. On the Gold Coast, this issue is even
further exacerbated by the lack of focus on the inclusion of any heritage that is not associated
with the ‘main strip’ i.e. Surfers Paradise and Southport.

Also discussed within the Focus Group was the lack of funding for heritage management.
This is particularly a burden with the listing of structures which were originally built with the
expectation that they were not being built for longevity. For example, there was great
reluctance recently by the City of the Gold Coast to agree to placing on the local heritage list
a building that was simply two temporary military ‘huts’ joined into a single building in
response for demand for ice during the massive influx of America soldiers on leave during
World War II. The building continued as ‘Miami Ice’ until recent years and had become a
local icon. However, the costs involved in removing the asbestos from the building and
maintaining it would have required substantial funds and, after much controversy, the City of
Gold Coast agreed to heritage list the property but was probably relieved in terms of costs
when the building was almost simultaneously demolished – presumably without permission
(Armitage & Burgin, 2015).
Opportunities

It would appear that the Gold Coast, at least to some extent, is sufficiently ‘young’ to have not yet projected a strong, lasting profile to the world beyond the strength of its mild climate and beach culture. However, in terms of the human inhabitants is a mix of, for example, retirees, singles, families and surfers. It is also a popular migrant destination, especially for those originating from the United Kingdom and New Zealand, and acts as a dormitory suburb of Brisbane. In addition to the diversity of residents, annually, the Gold Coast has a large number of tourists of all ages, both domestic and international that range over all ages and many interests. This rather eclectic mix of humans seeks the thrills of the Gold Coast although the identification of what the thrills include varies greatly among the various segments that make up the population and the tourists of the Gold Coast. While it is often said that it is not possible to be ‘all things for all people’ the observation remains that an extremely wide range of people visit the Gold Coast and many choose to retire to the Coast or, at least, return often, which indicates that the area is an attraction for a wide range of people. This highlights that there are potentially opportunities in broadening the base of themed tours to further incorporate heritage including, for example, ‘political, social and economic activities, together with activities associated with individuals or events’. It was also suggested that ‘additional heritage walks [or drive, biking, including multiple-day tours, both self-guided and organised] encompassing surfing culture, beach resorts and lesser known places and histories (even modern ‘histories’), together with those that focus on individual’s reflections on the past, or even focused on the ephemeral’ could be developed.

Threats

Even the placement of heritage places and properties on the Register may be a threat in terms of funds available when other opportunities emerge. For example, if the community’s desire to place the Miami Ice building on the Gold Coast Local Heritage Register, had been achieved, because it was never meant to be a permanent structure, it is very likely that it would have been an on-going burden for local government and thus rate payers. Unfortunately, many properties, and other infrastructure that do obtain listing, have limited potential to generate the funds to maintain themselves although there are exceptions. For
example, the Currumbin Wildlife Sanctuary developed from one individual feeding Rainbow Lorikeets in 1947. From this activity it expanded into one of the iconic attractions on the Gold Coast, and more recently, obtained by the National Trust, the enterprise has expanded further, and diversified into an even more successful wildlife theme park (Burgin, 2015). The City of Gold Coast has also been able to use a restored bathing pavilion as part of its premises (Armitage & Burgin, 2015). However, not all such heritage is readily able to provide funds for its own maintenance and the lack of funds is often a major weakness to the long-term maintenance of heritage. The cost of management of heritage as a commitment in perpetuity thus leads to a reluctance to listing (and acceptance) of heritage places and is thus both a threat and a weakness.

Major threats to heritage are also predicted to occur with climate change. Predictions (Stern 2006 *inter alia*) are that there will be more extremes in weather and thus stronger gale force, storm surge and erosion events. The cost of maintaining foreshore and canal estates is likely to be substantial with major, effectively on-going, renewal of sands on foreshores occurring. Expansion of urbanisation including infrastructure can result in the loss of mangroves and other intertidal communities including swales, swamps and even creek environs, which changes the pattern of flooding across the City. Specifically, even more likely to influence flow and erosion patterns in coastal areas is the proposed cruise ship terminal. If developed, this was predicted by the Focus Group to result in ‘serious changes in current patterns of erosion along adjacent beaches’. With such changed weather conditions, the threat to heritage, particularly ‘coastal heritage, will be significant and ultimately also impact on ratepayers and thus indirectly on funds to maintain or acquire local heritage’.

**Conclusions**

One of the major discussion points for the Focus Group was the definition of *heritage*. We, the authors, had deliberately avoided providing a definition and asked those present to not be constrained by definition. We argued that ‘we aimed to encourage people to think outside the square and not be constrained in thinking narrowly about what heritage might be’. This caused some consternation and much discussion. One strong voice believed that *heritage* was predominantly about ‘historic buildings and public infrastructure’ and scoffed when it was pointed out that the register of the City of the Gold Coast includes trees, indigenous items and places and even a neon sign as heritage. We concluded that our wish to cast widely and to consider the broadest possible view of heritage was a strength and opportunity and that the
narrow view of heritage espoused by our colleague as a weakness and a threat in terms of the SWOT analysis.

**References**


Delivering High Quality and Cost Effective Buildings to Remote and Regional Australia: The Case for Development of a Specialist Industry

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Delivering High Quality and Cost Effective Buildings to Remote and Regional Australia: The Case for Development of a Specialist Industry

ABSTRACT: Over the past decade I have had the opportunity to work with a number of regional and remote shires to design and deliver high quality, cost effective and climate appropriate buildings in Western Australia. Like many other parts of regional Australia, WA has seen its rural industry infrastructure eroded over the past 20 years as populations in rural shires have declined and economic activity has concentrated around one or two large industrial sectors, agriculture and mining. The building industry is one that has declined most significantly in WA with the result that procuring good quality buildings, or indeed buildings of any quality to regional and remote areas has either commanded a premium of up to 70% over metropolitan prices or has meant procuring transportable buildings with poor durability and poor quality and performance but still at a cost premium.

In my paper I will make the case for re-thinking the conventional building procurement process, taking advantage of modern methods of off-site construction and delivery of prefinished or partly finished products to site. I will present four case studies of completed buildings, domestic and community structures, and will analyse the cost effectiveness and quality outcomes and the design and fabrication processes. In the paper I will also discuss the change that is necessary in a sector of the construction industry in order for this sort of methodology to become the norm rather than the exception, and the relevance of the processes involved in these prototype projects to the building industry as a whole. The case will be put forward for this industry to be located in regional Australia rather than in metropolitan centres.

Keywords: Housing, Design, Prefabrication, Prototype, Climate Appropriate

Introduction

Most rural regions in Australia have experienced a sharp increase in the ‘rural exodus’ in the last two decades. Changing rainfall patterns and shifting rural economic activity have resulted in a decline in employment of all kinds - with the exception of the mining industries which typically employ staff from metropolitan areas on a fly-in/fly-out basis. [Ahuri report 12; Hillier, Fisher, Tonts. 2002]

While this paper is written from an architectural perspective based on practice, teaching and research experience in Western Australia which obviously has its own particular suite of circumstances, many aspects are common to other regions of the country. In WA, the decline in rural population hit rock bottom in 2003/2004. By 2006, the effects of the state’s resources boom began to draw people back into rural communities.[ Australian Bureau of Statistics - ABS - Regional Internal Migration Estimates by Region (SA2 and above), 2006-07 to 2013-14] [Shire of Perenjori Prospectus (Draft.2013) Investing in your future!]

Those returning brought with them ‘metropolitan’ expectations of living conditions and there was frequently a shortfall. Housing stock in rural towns was and is often of poor quality.
Older houses were often ill-maintained and newer houses tended to be the worst of the ‘transportable’ type made with poor materials, poor quality finishes and poor thermal properties. Combined with fairly indiscriminate site layouts, these houses proved to be energy gobblers and continue to be increasingly costly to maintain.

Figure 1. Western Australian regions:  
Figure 2: Western Australia: Geographic

However providing climate-appropriate housing that offers a similar standard of accommodation to that available in metropolitan centres has proved to be very expensive. Quoted figures list uplift factors of 20-30%¹ for rural construction but in a bespoke metropolitan housing market where tender prices fluctuate by up to 70%, the statistical evidence relating to building costs is at odds with the anecdotal. In the mid-west of WA where two of the case studies are set, it was not even a case of the inflated cost of building new housing - it was simply that no builders would even come to work in smaller central wheat belt towns in the mid-2000s².

In spite of economic conditions that offered an opportunity to improve rural housing stock, the difficulty in luring builders and tradesmen to these areas was a major constraint. Shires subsequently turned to transportable solutions - units designed for the mining industry with a limited life.³ Whether the ‘homeowner’ is the owner-occupier, the landlord or the bank, it seems reasonable to expect much greater longevity from regional housing stock as there are numerous examples of 100+ year-old houses that are climate-appropriate and still perform well.

Another aspect of the rural exodus is the lack of specialist housing available in regional areas. Two main groups are particularly affected. The first are the young who, in addition to seeking employment and educational opportunities, also want to move out of home - but not necessarily into

¹ Uplift factors for rural construction are published annually by various public and private agencies. Factors will differ from region to region.
² Authors experience and records
³ Most remote and rural shires in WA will have purchased this type of accommodation over the last 10 to 20 years.
large 4x2 homes. The elderly, by contrast, often need to move out of their town or farm homes and would mostly prefer to age in the town or shire where they have spent their working lives. ‘Aging in place’ is now generally recognised by our society as being the preferred option for retirees as it allows people to remain a part of their community and maintain networks of family and friends. There are also economic and cultural benefits for all involved as it allows the community to retain a valuable part of their knowledge bank and social diversity and the shire to maintain a ratepayer! In the housing market, aged or retirement housing represents a specialist ‘type’ - even though the features are not very different to regular housing. ‘Specialist’ buildings typically demand a premium over standard housing as exemplified by the inflated cost of most retirement accommodation, whether managed or freehold.

The issues of quality that are pertinent to the provision of rural and remote housing centre on several factors. The availability of labour is limited by the quantity of local tradespeople in rural areas available to build houses. The quality of the labour in an industry that already struggles to provide consistently high quality work is further compromised by the fact that building crews who do go to the regions tend not to be the best available. Another factor is the trend in recent decades towards less appropriate design for the Australian climate. Instead, the tendency is to rely more on fuel-hungry air conditioning and heating rather than suitable building materials and design, using well proven devices such as the traditional deep verandah, steep roofs and high ceilings. The higher cost is compounded by relatively inefficient rural utility networks with substantially higher delivery costs than in metro areas which reinforces the case to draw less on such services. Generalisations in the zoning of climatic areas and a bias towards the industry’s preferred brick and tile construction methodologies also contribute to poor thermal performance and higher running costs. An example of this zoning generalization is the case of Kalgoorlie, where one of the zones is centred and the data is drawn from, and a small wheatbelt town 600 kms to the west. Both fall into the same zone and draw upon the same climate data for regulatory purposes. In Case study 1 below, when local climate data was substituted in the rating model for the official ‘zone’ figures, the thermal performance rating improved from 5 to 7 stars.

1. Alternative Models to Deliver High-Quality Cost and Climate Effective Buildings to Regional Australia

The opportunities and demand for better quality, affordable and climate-appropriate housing in rural and remote Australia is stimulated by a number of factors and sources. The demand emanates from the agricultural sector, the service industry sector, and the various ‘in migrant’ groups attracted to rural centres by spin off activities from the resource industry sector.\(^4\) [Report 21.2007. Haslam McKenzie. Desert Knowledge Cooperative Research Centre –DKCRC- &. Kingwell & Pannell. 2005. CSIRO Economic trends and drivers affecting the Wheatbelt of WA to 2031]. For consideration also are the efforts of shires to attract more culturally and professionally diverse groups to stimulate the local economies and enhance the overall quality of life in the community through a broadening of the scope of work, cultural and leisure activity in the locality.

\(^4\) And by Authors observations. [DKCRC: Desert Knowledge CRC]
The three sub-groups in need of ‘specialised housing’ the agricultural sector are:
- Young people who want to remain in rural areas which have little appropriate housing for singles or young couples so are forced to stay home or leave town.
- The ‘dispossessed’ retiring parents of the generation taking over the family farm and farmhouse who typically move to less-than-optimal accommodation on the farm or to the nearest often far-flung metropolitan centre.
- Current farmers wanting to improve old, substandard accommodation

Providing suitable housing for service industry sector personnel often proves to be a major problem for the shire. Police and teachers housing is provided directly by government agencies [In WA by the Government Employees Housing Authority - GEHA] whereas other shire employees housing remains the responsibility of the individual or of the shire. [Country Housing Authority: Annual Report 2012 – 2013] Low quality housing makes it difficult to attract high-calibre candidates such as doctors and shire administrative staff, who contribute significantly to developing and maintaining rural economies.

Demand is also driven by higher expectations of building quality and performance and a growing awareness and interest in sustainability both through energy and water conservation and the use of appropriate materials. It is noteworthy that some shires in WA have successfully developed ‘specialist’ housing for single people and retirees [AHURI report 12; Hillier, Fisher &Tonts. 2002] but the issue of affordability remains problematic. Few of these communities are large enough to support a local building company with the range of skills required to construct and maintain a large range of building stock. Some have been more proactive and inventive in meeting the largely unmet demands of all these different groups but it is invariably at a disproportionate financial cost to the quality and durability of the outcomes. [AHURI report 12; Hillier, Fisher &Tonts. 2002]

One obvious way to attenuate the inflated cost of the ‘metro-to-country’ building industry is to take advantage of modern methods of fabrication and delivery and pre-fabricate some or all parts of buildings in factory-controlled environments where quality and workmanship can be more easily monitored.

The pre-fabricated building is then shipped to the site where the minimum of preparation is necessary to fully install the building and connect it to local power, water, waste water/sewerage and telecom infrastructure systems. This means that both labour time and costly site preliminaries such as temporary services, accommodation, communication and insurance are reduced to a minimum. The interest in reducing labour costs becomes self-evident in the light of the typical labour to materials ratio for domestic buildings which is in the order of 70%:30%. [Authors collected sources: see references for samples]5

Prefabrication also allows for much easier coordination of all the various different trades. On a conventional building site, the ‘order of work’ often causes significant delays. For example, the sub-contractor electrician waits for the plumber to complete his work while the plumber is busy juggling the demands of multiple callouts for multiple jobs.

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5 Ratios will vary according to quality of materials, difficulty of execution and local labour market costs. Worldwide, in developed countries a 70/30 ratio is a reliable rule of thumb backed up by all sectors of the building industry.
Whether the pre-fabrication process entails just components or an entire building, there are a number of constraints. The most obvious is dimension. The sizes of the building or components are restricted in length, breadth and height to what can readily transported by road. This constraint will also affect the dimensional parameters within which the design can be carried out, potentially leading to inappropriate compromises. Construction methodology is also affected. Typically this means the building will have a framed structure - generally of lightweight steel - which is typically built on either a lightweight concrete slab or a series of slabs that will be ‘joined’ after delivery to the site.

The typology of the transportable home has been perfected in the American ‘mobile home’. The contemporary Australian industry equivalent is the mine site ‘Donga’[See figures 3-6]. Both of these model types are slaves to and remain firmly within the constraints they are obliged to observe. The donga is, in spatial and structural terms, a braced box with the minimum of openings in its walls. This ensures that little or no extra bracing is required to maintain the integrity of the structure as it is lifted onto a truck and passes through the equivalent of a 10-24 hour sustained category one cyclone as it is driven at speeds of 110kms/hour to its site!

![A donga wrapped for transport](image1.jpg) ![Donga fitted out for transportation](image2.jpg)

A donga, however, does not make for ideal living spaces in a permanent home. Such luxuries come at a higher price and demand a more complex design solution. Consequently, efficiencies of the design type begin to compromised. Some Australian companies are now producing transportable homes of a reasonable standard but the cost savings are not as significant as the production processes might imply. Typically these better quality transportable homes cost only a little less than a conventionally built home. When combined with the fact that the constraints within which these buildings are defined hamper their ability to respond effectively to program, site and climate, the apparent savings demand further consideration. Finally clients might also consider that the largest component by volume that they have paid to have transported to their site through ‘cyclonic conditions’ [see figure 4, 6], is available free of charge at the destination: air!
This section analyses four case studies of buildings that have been delivered to rural and remote areas. One is modular, two are combined modular / flat-packed, and one is component prefabricated. The latter is not a domestic project but offers insights into the potential of using state-of-the-art prefabrication processes over conventional building in remote areas in the domestic building market.

2. Case Studies

Case Study 1:
The brief was to provide transportable housing to a shire located 400kms north of Perth. After discussion with the Economic Development Officer [EDO], it was decided that a hybridised solution would be adopted that entailed fully prefabricating and shipping the ‘wet’ modules [kitchen, bathroom, laundry] of the house to site. A flat-packed panel system available on the market at the time would be used to build the remainder of the building. The two-bedroom building was a prototype designed to take maximum advantage of passive heating and cooling [Figure 7,8]. The local climate ranges from temperatures of over 40°C in summer to short periods of below-freezing temperatures in winter. The prefabricated parts were to be professionally built in Perth and the remainder of the build was intended to be a community effort. This decision was later reversed and when the go ahead to build was given in 2008, a Perth building contractor was appointed at the height of the mining boom. The consequence of this was that the majority of the work was undertaken by one skilled carpenter/bricklayer rather than by a team which ultimately resulted in the build period being much longer than anticipated. The completed building was handed over in 2010 and has performed as well, and in some respects better, than intended.  

The project highlighted a number of lessons that are both particular to this project and typical to this type of construction.

Design fundamentals: design for the expected workforce.
This project was designed assuming there was a large, local and resourceful workforce available and that cranes, forklifts and excavators could be easily procured. In this scenario, no problems...
would be posed by large unwieldy floor and roof panels. When the contracting system changed, these issues proved problematic both logistically and cost-wise.

Design for sustainability: the need to understand well the properties of the soil when sustainability and a low carbon footprint are important.
The project site was in a new subdivision that sat in a 100-year floodway which meant the ground floor of the building had to be raised 600-800mm. above existing grade. The decision was made to bring in just enough fill for the building’s footprint rather than the 500m³ which was required for the whole site. This saved transporting about 400m³ of fill. The fill was specified to be compacted in 250mm layers which is common practice. This was done by using a road roller which over compacted the ground to such an extent that when it came to excavating for the foundations of the house, the soil had to be jack hammered out, such was the compressible properties of this ‘highly compacted gritty silty sand’.

Window and door joinery. Specify building components that are fit for the local conditions and are easily serviced locally or from the nearest metropolitan centre:
Because a single leaf SIP [Structural insulated panel] was used for external and internal walls, a window product was required with either a thermal break in the frame or a very low thermal conductivity material for optimal performance of the house. An extruded fibreglass double glazed system was specified, using double hung tall windows in order to better control airflow. When the product was delivered to site, most of the units were damaged, possibly from the crate having been dropped during handling in transit between Sydney and the building site in WA’s mid-west. While the obvious defects were able to be replaced after some delay, hairline cracks in the core material did not show up until sometime after handover when a layer of fine red dust brought these defects to the fore. Over time, the accumulation of fine dust also compromised the smooth running of the hanging mechanisms of the windows and the sliding mechanism on the doors. Another problem arose with the size and weight of the units. The manufacturer appeared unaware that the counterbalance mechanisms and the hardware were clearly not robust enough for the size and weight of windows that were ordered. The many failures of these mechanisms in service has caused great frustration and additional costs involved in fitting replacement parts. While these windows appeared to be a fine low maintenance solution, they have proved to be problematic at many levels in service, some of which appear to be inherent to the product design.

Wall Panels: using innovative building products.
The wall panels around which the design of this building was based were relatively new to the WA building materials market. The original company producing the panels struggled to maintain financial viability. This resulted in the manufacture of these panels changing hands twice during the course of the project and the final price consequently rising by over 200%. Since all contract documents had been produced for these particular panels, the decision was not easily reversed when this came to light.

Roof Panels: using innovative building products for best practice passive design: Admitting winter sun in high latitudes.
The house is designed to let in as much winter sun as possible, and to prevent spring and summer sun from penetrating the building at all. In order to allow winter sun penetration to as large an area of the floor slab as possible, a high window head height is required and consequently a high eave. This eave then has to project a long way beyond the facade in order to prevent summer sun penetrating the building.

7 Manufacturer was adamant that the mechanisms were robust enough for the weight of the window sashes.
8 At 5/6/08 the wall panels were quoted at $10,500. At 17/12/08 wall panels were re-quoted at $12,200. Final order placed on 9/11/09 for $22,158
efficient single leaf insulated roof panels that were used required extra bracing to tie down this projecting roof edge in order to meet local wind conditions. Installing this bracing is a skilled and precise job, and without a trained and practiced workforce, the bracing was difficult and cumbersome to install and required two lifts of scaffolding to carry out the work. This proved to be a costly exercise in spite of the fact that all of the components were pre-fabricated off site and shipped to site ready to fit in position.

Figure 7. House 1 North elevation. November 21st sun shading.  
Figure 8. House 1 June 21st sun penetration.

Lessons learned: The bigger picture.
The lessons learned during this project were procedural as well as design-based. A thorough knowledge of the conditions in which the building must function, and of how different materials function in different circumstances would have led to a number of different decisions being made in the first ‘prototype’ house. There was an opportunity to put these alternative decisions into practice in a second house that was built in the same shire two years later. The second house differs in program only in that it is a conventional four bedroom, two bathroom family house on a slightly larger 1000 m$^2$ block.

Case Study 2:
From the outset of this project it was clear that this building would go to conventional tender. Recognizing that the building industry is generally resistant to change in the domestic market, the second building was designed to be properly tuned to the standard building practices, skills and materials that are likely to be available, or at least not far away, in rural and remote areas. Consequently, the second house is entirely timber-framed but remains a flat-pack design with the bathrooms and laundry fully prefabricated and pre-fitted in the Perth workshop. These are constructed from a rigid structural panel system with a solid core of insulation that is available locally. The wall panels used in the house are designed by the project authors as a ‘core’ that requires an external finishing layer and an optional internal finished layer. These panels have the advantage of being light-weight which means they are easy to man-handle. The R2.5 felted sheep wool insulation that is included in the panel does not hamper easy conventional access by electricians on site. The panels comprise wall and floor structural elements. [Figure 9,10]. All service connections happen either below the floor cassettes or in cabinet work above the floors. Conventional prefabricated gang nail trusses that are configured to allow a single colourbond sheet to be sprung over the apex of the roof comprise the roof assembly. This eliminates the need for any
ridge flashing or multiple handling of roof sheets. The building is lifted off the ground using adjustable steel stumps with integral ant caps, which meet the local requirement for the floor to be raised above grade and eliminates the need to bring any fill other than topsoil for planting purposes onto the site.

![Figure 9: House 2: Wall core flat pack panels.](image1)

![Figure 10: House 2: Conventional truss roof.](image2)

**Climate Performance Sacrifices:**
The more conventional roofing system used sacrifices some winter solar penetration, but is justified by the reduction in build costs and time from a procurement point of view. [figures 11, 12]. Summer solar shading is not compromised, and because trusses are used, there is no need for the extended eave cantilever to be supported thus only a single scaffolding lift was required during installation. The lightweight components meant that no heavy lifting machinery at all was required during the build.

**Flat pack and pre-fabricated modules:**
This kind of hybrid fabrication system requires more time on site than when a more conventional prefabrication system is employed. However, the components of this project go together very simply and quickly so the project had only a 26-week delivery period which included prefabrication. The flexibility in design that the modular panel system offers is an important benefit of this kind of construction.

![Figure 11: North Elevation (front) June 21st, Noon.](image3)

![Figure 12: North Elevation: November 21st, Noon.](image4)
Further modifications:
Some further simplification of this process would deliver even more time and cost dividends. These simplifications would include a rationalization of the roof line so that the cutbacks of the carport roof area as well as the cutback over the northern winter deck would be eliminated.

Case study 3:
This case study examines a fully modular approach to building for rural and remote areas. The building was originally designed as a display house for the WA Timber Advisory Centre [Timber Advisory Centre sponsored by Forest Industries Federation WA – FIFWA- at HomeBase Expo, in Subiaco. Closed 2008] and was never finished externally in its original manifestation. As it was designed to fit onto a standard fixed-axel flatbed truck, each module measured 2.4m x 6m. It was fully prefabricated and finished in workshop conditions so each module required substantial bracing in preparation for handling and the road trip to its site destination some 250kms southeast of Perth. One Saturday morning, five articulated low loaders, four carrying 2 modules each and the fifth carrying one module plus ancillary materials, shipped the components to the site. The modules were lifted into place the same day so, by 4pm, the building was ready for the installation of the roof trusses and sheeting and the external cladding. [Figure 14] For this process to be efficient, several potentially cost-increasing factors need to be considered.

Module size:
Constructed on individual floor cassettes, each semi-autonomous module had to be built to precise dimensional standards in order to be able to connect the parts when installed on site. In the smaller rooms, this is less critical but in the large living/dining/kitchen room which comprises four modules without the deck, each junction is clearly on show in the floor, wall and ceiling finishes. For these modules to be successfully handled at factory, trucked to site then re-handled at site delivery, removable bracing must be designed into the modules from the outset.

Figure 13: House 4: Future Farmhouse Complete. Figure 14: House 4: Module assembly complete, 4pm Saturday
**Module configuration:**

This building was originally designed as a two storey structure for a suburban site: the reconfiguration for deployment as a single storey structure was easily effected with the addition of one extra door: because it is a timber framed structure, this alteration was simple to undertake. Some further standardisation of these modules could make for a system that was configurable in a limited variety of ways, providing the onsite finishing trades were available. In this way, this typology could become economically viable, and would have enough flexibility to adapt to a variety of different site conditions and orientations. This would offer a semi bespoke design option for different client groups and different site conditions.

**Analysis of case studies 1-3**

It becomes clear that when cost minimization is prioritized, there is loss of design flexibility - and design flexibility is essential if climate-appropriate housing in rural Australia is to be achieved at either a cost-competitive or cost-reduced level. For climate-appropriate design to work, several factors must align. The first is orientation in relation to both the site and the compass. As long as planning regulations demand that buildings must face the street, optimal orientation can rarely be achieved.

In the three previous case studies, design flexibility was a priority establishing each of the projects. The advantage of the flat pack system used in case study 2 [figures 9,-12]is that with the three panel variants, a wide range of plan configurations and sizes can be achieved as long as a basic 600mm planning grid is used. The use of these standard modules with which building crews are familiar allows a bespoke building to be erected quite rapidly.

The flat pack system can more accurately be described as a component rather than modular build. This means the basic wall and floor components can be pre-manufactured and stockpiled, ready to be selected by number to fulfil a particular design configuration. Only the roof trusses then need to be custom manufactured - and since this industry has relatively sophisticated production processes, there should be neither time delays or cost premiums for a ‘bespoke’ design.

Specialist machinery is only required when lifting the bathroom modules from transport to floor platform or deck. This can be achieved with a forklift or small crane. There is minimal risk of damage in transit as the modules are constructed from rigid polystyrene sandwich panels (SIPS) as noted above. These fully fitted three dimensional modules comprise the building ‘core’ from which the wall panels are braced during assembly on site. [Case study 1 & 2].

A fully modular system as discussed in case study 3 can offer design flexibility if the modules are kept to an optimum size. [Figures13 & 14]. A module of 2.4m x 6m appears to be the optimum size that offers a good range of design flexibility and is also ideal for transport. However this size means that each module would need to be built to order rather than being able to bought from an ‘off the shelf’ stockpile unless some of the design flexibility and optimization is eliminated. Essentially, the build operation would be unique to each order in a similar way to the current housing market products.
Case study 4:
This case study departs from domestic projects and examines an outdoor theatre structure. The structure which was designed for community use was delivered to a redevelopment area in a town situated 2000kms north of Perth. [Figure 2] The purpose of discussing the project in this context is to demonstrate the potential of prefabrication and pre-assembly of complex structures and to consider how these technologies could be transferred to the domestic architecture market.

There are several outstanding aspects to this project. In 2011/2012 when this project started, there was only one company in Australia with the capability to take architect’s design files and bring them directly into CAM or computer-aided manufacturing files for CNC or computer numerically controlled milling of large scale timber structural components. [Figures 15, 16] The efficiencies gained by working collaboratively with this company were quite remarkable. The end result was the shipping of the structure on one truck pallet 5000kms from Melbourne to the northwest of WA with the large elements partially assembled and all fixings and fixing points prepared. The foundation plinths were constructed prior to the arrival of the pallet which meant that, within 3 days, the whole structure was erected and secured. [Figures 17, 18]. In a further 2 days, the covering membrane, which had also been constructed directly from the design files, was fitted and secured. The structure measures 18m from side to side, 6.5m deep and 6.5m high at the apex.

Figure 15: Component manufacture and pre-assembly.
Figure 16: Components lifted into place.

As a production system, and as a collaborative design process, the project was exemplary. It was brought to site on time and within budget. The project is essentially prototypical in design and in the mode of production. It also uses Laminated Veneer Lumber from a West Australian factory as a featured structural material. The design and production of a complex shape in this process is seminal in Australia and indicates that the potential for rapid production of structural systems for domestic architecture could be achieved rapidly and cost effectively. The fact that the structure uses an engineered timber is incidental. The process remains the same if the choice had been made to use a native hardwood or structural softwood. What is of note is that the fundamental properties of working in timber with sophisticated machine centres directly from computer generated 3D design
models offers a degree of flexibility to the designer, the fabricator and the builder that other materials such as steel do not offer.  

![Figure 17; Detail components assembled in place](image1)

![Figure 18: Finished building](image2)

2 Where to From Here? The Case for the Development of a New Rural Building Industry.

Each of the projects discussed in the case studies relied on at least partial fabrication in metropolitan centres followed by longer or more rapid assembly and finishing on site. This hybrid process of production of housing can deliver substantial advantages in design and performance of the end result.

Each of the domestic case studies were dogged by some of the typical constraints of working at a distance from metro centres and working with an industry that has set ways of doing work. In one case, it was also constrained by the legislative protocols of the client body. The issues encountered ranged from the logistical and organizational capacity of the builders in charge of the project, which was often poor, through to the difficulties of housing construction crews at remote locations for weeks at a time.

Everyone has become used to the idea that these industries need to be located in metropolitan centres both because of the resources available as well as the notion that the range of market opportunity is too restrictive in rural areas. This attitude fails to consider the potential advantages of establishing, or re-establishing, building industries in rural areas. There are several obvious favourable factors underlying this prospect. Among these factors are the plentiful and cheap availability of land or premises and potentially a good labour market with diverse skills and a predictable pattern of seasonal activities. Not to be overlooked is the greatest resource of rural communities - the ingenuity and resourcefulness of a population long used to making things work from whatever is at hand which is often very little!

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9 Consistency of detailing methodology; consistency of fixing and erecting methodology; consistency of finishing treatments.
Finally, there are two quite unique factors. Firstly, there is the proximity to a market demand that has been growing for at least 10 years [Ahuri report; Hillier, Fisher, Tonts. 2002]. Substituting a country-to-country and eliminating the city to country delivery cycle brings the market, on average, one hour closer to the point of supply [in Western Australia by eliminating the trip from urban centres to the periphery]. Through truck routes and back loading opportunities can also be factored into the distance equation, as can the resources of equipment available in the rural sector. Large trucks are needed occasionally by small building enterprises but are not used daily. Why not put the farmer’s idle truck to work rather than go to a metro-based logistics company?

The last, and potentially the best, reason for establishing a building industry based in rural Australia is the opportunity to re-invent the industry, how it interacts with clients and how it delivers its product. A one-size-fits-all approach does not work with all the vagaries of rural life. An industry that is based on component or modular prefabrication can deliver the varied responses that the market demands through smart design using standardised components. Rather than continuing to mimic the way the typical domestic housing industry functions now where every project takes a year to build, using smart logistics planning and intelligent scheduling could reduce the production time of a typical house by at least half. This could probably be cut by half again when the proponents are practiced and the inevitable improvements in technique that come from practice produce even greater efficiencies in the assembly and finishing process. The skills required in the fabrication and on-site assembly of components is as closely allied to riggers skills as they are to carpentry. This means that any start-up company would be able to draw from a wider net of skills for their labour resource - skills that are typically found in rural communities. The opportunity to re-think the conventional building process also presents the opportunity to independently evaluate and re-structure the costing of component-built homes. Closer collaboration and liaison with design teams and with client bodies could mean a more effective and more economical procurement cycle. This potentially reduces establishment costs in the first instance and, through collaboration with rural communities, could also deliver tangible benefits to those communities. These benefits may include increased training and employment, as well as improving the housing stock and demonstrating the value of climate, site and program appropriate dwellings - in short, the ability to see what is possible in a field that has been constrained for too long by lack of imagination and minimal funding.

In Australia, for the most part, we live in a benign climate that allows most forms of work to carry on throughout the year. There are however, parts of the world like the North American ‘snow belt’ where the weather is inclement to the point where outdoor building activity has to shut down for 4-5 months of each year. This gives the industry the kind of activity cycle that we typically associate with farming and horticulture.

What if a rural building enterprise took the view that, as there are seasonal labour shortages and seasonal labour gluts, it could take advantage of the gluts to deliver buildings to sites when more staff are required - while a smaller skeleton crew works the otherwise busy time preparing inventory and fabricating bathroom modules and other components. Since the skills that a component-based building industry needs are relatively unconventional, the issue of deploying ‘undertrained’ craftsmen is sidestepped.
Another advantage of establishing a rural building industry is the general understanding of climate and the resources of the land that tends to be lacking in those that live in the city and work or deliver work to rural areas. What used to be called ‘common sense’ is found in large supply in the country - and one of the basic design demands of rural housing is the kind of common sense and local knowledge that understands the value of verandahs and deep eaves and how to shield houses from (WA’s) cold southerly winds and hot easterlies. Such ‘deep’ human resources are of fundamental importance in the rural economy.

Clearly some kinds of building activity need to stay in the metropolitan areas. The fabrication of large-scale structural frames that might be used in community buildings, by the agricultural sector or in the education and medical field (as discussed in case study 4) are probably most appropriately located close to the larger markets as their production cycles are rapid and specialised. Similarly building supplies merchants would probably remain most effectively located in the metro areas, delivering to rural as well as to metro sites.

This ‘vision’ of a new kind of rural building industry is one that is more homogenous than the conventional building industry, and much more opportunistic in the way that it goes about planning and ordering its business. It is an industry that takes advantage of the seasonal cycles of work in rural areas so that it is busiest when there is most casual labour available. To be successful, this industry must be collaborative in its style of management and implementation from the outset and will need to plan creatively and strategically to meet its goals.

It is an industry that establishes its products in such a way that it becomes functionally autonomous in relation to conventional supply chains. It does this by fabricating whole building components and stockpiling them [as a conventional builders merchant might stockpile materials] ready to deploy to the next building project when the time is right. It is an industry that is extremely well organised, and it is one that has some transparent financial protocols such that the client, the subcontractors and all parties to the contract to build know what element of income and expense goes to what cost centres.

This is an industry that needs to prioritise planning and logistics in order to be where it said it will be, when it said it will be. The rural sector has plenty of practice in this skill: farming ‘late’ means missing the rain, wasting the harvest, losing the lambs. The metro house building industry operating in a flush labour market, needs to be less precise and less agile. Being late on the job in the country means there is no job left to do. A rural housing industry idea might arrive too late unless some support is given to the concept of re-establishing rural building industries.

Figure 18. a)House 4: Interior to north deck. 18 b) Wall Panels Stack. 18c.) House 4: Stump and bearer assembly
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Illustrations:

Figure 1: Bushwalking Western Australia. http://www.gl-of-wa.org.au/western-australia-bushwalking/

Figure 2: Western Australia. Map of Western Australia - Western Australia maps http://mapsof.net/map/map-of-western-australia


Figure 4: Typical layout for transportation in standard Donga. http://jayzbuilding.com/about.htm

Figure 5: Typical Donga: Windows are kept to a minimum: http://www.hotfrog.com.au/Companies/Northern-Transportables

Figure 6: Transportable ready for travel and for Cyclone preparation: http://www.ausco.com.au/products-services/additional-services

Figures 7,8,9,10,11,12,13,14,15,16,17,18: The author.
Innovation in Regional Manufacturing: a Hunter Based Study

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Innovation in Regional Manufacturing: a Hunter Based Study

ABSTRACT:

AIM: Identify enabling factors and barriers to competitiveness and innovation for Hunter manufacturers.

BACKGROUND: Recent local and national trends highlight that the future of regional manufacturing will lie in firms enhancing their international competitiveness, having an export market focus and integrating services with their manufactured products. Success will also increasingly depend on the ability of individual businesses and the region to compete on innovation. Particular challenges include difficulty in accessing funds for research and innovation and difficulty tapping into new knowledge.

METHODS: In-depth interviews were undertaken with a convenience sample of 45 Hunter-based manufacturing firms to understand more about the enablers and barriers to competitiveness for Hunter manufacturers and identify ways in which innovation can be encouraged. The Hunter manufacturing sector like many regions within Australia is dominated by small to medium size enterprises. Many spoke candidly about their experiences under challenging market conditions.

RESULTS: The results indicate that while innovation of new processes is seen as essential to increase efficiency and revenue of firms and is internally driven, innovation of new products or services develops in a more ad hoc manner largely in response to customer needs. Funding innovation was consistently raised as a problem, while collaboration, within work teams, customers and research organisations, was seen as a potential facilitator of greater innovation. The study concludes with suggested ways forward for firms and policy-makers to promote greater innovation of processes, products and services within regional Australia’s manufacturing sectors. These include regional strategies to promote collaboration and partnerships between firms and research and training hubs, and greater opportunities for business mentoring, particularly in medium to long-term strategic planning.

Keywords: Manufacturing, innovation, management, regional employment, small and medium enterprises.
Introduction

Within Australia and the Hunter Region goods producing industries such as manufacturing make a substantial contribution to employment, exports and generating new-to-the-world products (RDA Hunter, 2014). In the Hunter, manufacturing is the third largest industry of employment, behind health and social assistance, and retail trade. This is despite the headwinds the sector has faced through increasing international competition, exacerbated by the strong Australian dollar, and most recently the downturn in mining investment in the Region. The majority of the Hunter’s manufacturing employment is in small/medium enterprises (SMEs) in machinery and equipment manufacturing, and primary metal and product manufacturing sectors. Recent local and national trends highlight that the future of regional manufacturing will lie in firms enhancing their international competitiveness, having an export market focus and integrating services with their manufactured products. Success will also increasingly depend on the ability of individual businesses and the region to compete on innovation.

In early 2014 the ‘Regional Competitiveness – Manufacturing’ project was developed by the Hunter Research Foundation in collaboration with an industry-based Stakeholder Advisory Group. The overall research question was to identify what is needed or can be done at a regional level to support local manufacturers to broaden their customer base and connect into global supply chains. The objective of the project was to identify ways in which Hunter manufacturing can be strengthened including recommendations for policy makers and insights for individual organisations to use in their future business planning. The results of this qualitative study are presented here, with a particular focus on innovative practices and enablers of innovation amongst Hunter manufacturers.

This paper is structured as follows: Section 1 provides a brief overview of the relevant national and international literature on innovation and state of play in national manufacturing, Section 2 outlines the project methodology, Section 3 provides an overview of findings in relation to innovation within Hunter manufacturing and Section 4 concludes with a discussion of potential policy implications and opportunities for the future of manufacturing within the Hunter.
Innovation and Manufacturing

Innovation is increasingly seen as necessary for long-term job creation and economic growth (OECD, 2011:109). Trends in national innovation policies are emphasising the important role of regional processes which are collaborative and place-based (OECD, 2011:110). Recent research into performance within the manufacturing sector points to a correlation between innovation and revenue growth; with the most innovative manufacturers overall growing significantly faster than the least innovative (Price Waterhouse Coopers (PWC), 2013:4). Such pressures are only likely to increase with the advent of ‘advanced manufacturing’ marked by highly agile, networked organisations that use information and analytics as much as they do talent and machinery to deliver products and services over the product-lifecycle to global markets (McKinsey, 2012:1; CEDA, 2014).

However pressures on Australian manufacturing have been mounting over the last few decades (Report of the Non-Government Members, Manufacturing Taskforce, 2012:18-20). These include: a high dollar eroding competitiveness, rising costs such as energy costs and poor productivity growth, tougher competition from emerging economies and the adverse impact of the global financial crisis, an associated slowdown in related areas of domestic demand and the recent waning of the resources cycle, especially pertinent for mining and resource dependent regions such as the Hunter.

The OECD characterises Australia’s linkages to global value chains as weak, not as a result of volumes of Australian exports, but because our exports are increasingly concentrated on unprocessed minerals and fuels. Australia’s current competitive strengths are mainly in low–medium technology manufacturing, where we are innovators. Australia’s success in advanced manufacturing is likely to be in specific niches, with opportunities in high value-added products and services (Non-Government Taskforce on Manufacturing 2012:13). Part of the difficulty for the Australian manufacturing sector and the Hunter in particular is that it includes a disproportionate number of small firms, many of which operate in small markets, resulting in fewer economies of scale and lower productivity (Non-Government Taskforce on Manufacturing, 2012:14). Australia’s scale and remoteness further work against competition, innovation and export growth. The Report from the Non-Government Members of the Prime Minister’s Manufacturing Taskforce (2012:15) indicates that this may explain why “Australia is not generating the pool of innovative, globally oriented medium-sized firms that underpin dynamic, thriving economies.” The acceleration in the pace of change in information technology creates special challenges for Australian SMEs who often lag behind in the
adoption of Internet technologies and the skills base required to successfully adopt these technologies (Adams et al., 2014). However other work by the OECD (2007) examining the concept of regional innovation systems, explores the role of SMEs in innovation. It highlights that small firms are often more aware of niches or emerging markets than are larger firms. Small firms very often support larger firms in research and development activities, particularly where this expertise is not available in the larger firms or it has declined in favour of production activity (OECD, 2007:84).

*Samson and Gloet (2014:6460-61)* outline a number of factors related to an innovative SME, these include the presence of:

- **Innovation strategy** including elements of strategy; resources for innovation; customer focus; balance between large and small scale innovation and developing an appetite for risk.
- **Innovation processes** including change management; external partnerships, quality practices and philosophy and a sustainability focus.
- **Innovation rewards/recognition** including attracting and retaining high-quality employees; recognition of innovation contributions; and staff for innovation.
- **Innovation measures/payoffs** including measurement of innovation activities and innovation performance in the form of new products and/or services.
- **Innovation behaviour/culture** including values and culture to support innovation; change focus; learning culture; tolerance of failure; creativity and lateral thinking.

International and Australian research has highlighted the value of human capital management practices in promoting innovative work cultures in building the innovative capacity of firms. These include high performance work practices for improving business performance (van Wanrooy, 2014). Typically not requiring extensive capital outlays or R&D commitments, such practices are focused on: a) improving employees’ knowledge, skills and abilities, b) motivating employees to perform and c) providing employees with the opportunity to contribute to how their work is done. A study of more than 1,000 manufacturing SMEs, commissioned by the Australian Government Department of Industry, found only 37 per cent of manufacturing SMEs were identified as having a “moderate” system in place. That is, at least four practices of each of the three types listed above. The researchers did not find a manufacturing SME in Australia that had a “strong” system in place. However the survey found
for every additional high performance work practice that was used there was an increase in profits, quality of products and services, labour productivity, innovation and customer satisfaction, as well as an improvement in relationships in the workplace.

The OECD Regional Outlook (2011) emphasises the central role of regional policies, in addition to the practices of individual firms, for realising the innovation potential of local economies. A highly skilled workforce is necessary to support innovative activity, and those regions with most capacity to innovate are those with a labour force that is skilled and adaptable. It also highlights the importance of network models of innovation, and that “public authorities tend to favour policies that encourage inter-firm cooperation, rather than provide direct financial assistance to individual firms” (Freel et al., 2006:293) in most OECD countries, see also Woolley and Eversole (2013).

Methods

Stage 1 of the ‘Regional Competitiveness in Manufacturing’ project commenced with a review of global factors impacting on manufacturing, and recent national and international trends that apply in the Hunter. A small number of in-depth interviews were also conducted with industry groups and local innovative firms identified as having effectively dealt with some of the challenges facing the manufacturing sector. Using the outcomes of Stage 1 and in consultation with the Stakeholder Advisory Group, the project objectives and research questions for Stage 2 of the project were refined. This report outlines the tasks undertaken in the second stage of the project and the research findings.

The focus for Stage 2 of the project was to understand more about the barriers and challenges facing local manufacturers, how the levers to positive change nominated in Stage 1 of the project were being used and to provide an evidence base for collaboration with key stakeholders in developing targeted regional initiatives that will support Hunter manufacturers to be more competitive.

More specifically, the objective for this second stage was to undertake in-depth interviews with Hunter-based manufacturing firms to identify:

- enabling factors and barriers to competitiveness for Hunter manufacturers
• ways in which innovation (defined based on the OECD’s *Oslo Manual* which provides guidelines for collecting and interpreting innovation data) and business planning is being undertaken

• participation in global supply chains

• suggestions for initiatives or strategies to support Hunter manufactures.

The question path was designed to support semi-structured in-depth interviews that would explore the themes and key levers. Topics included:

• Key products and services, staffing and ownership

• Current market drivers, customer base and profitability

• Changes in the business and main challenges over the last five years

• Development of new or improved processes, services or products

• Collaborations and planning for the future

• Regional initiatives to support Hunter manufacturers over the next 5 - 10 years.

A copy of the interview structure is shown in Appendix 1.

The sample was selected from membership of industry organisations. The initial sample was expanded via additional contacts provided by respondents. The sampling aimed to reflect the range of sub-sectors, size, ownership and location of manufacturing firms in the Hunter Region. Start-up firms and those providing manufacturing maintenance services were included in the sample. Firms currently seeking an exit strategy were to be excluded from interview however no firm contacted clearly indicated they were in the process of closing their business. In-depth qualitative interviews were conducted with 54 Hunter-based manufacturing firms. The interviews were conducted onsite at the participating businesses with the exception of one interview conducted by telephone. The interviews were approximately 45-60 minutes in duration and undertaken 21 July – 15 September 2014. Participant responses were recorded with handwritten notes and, where possible, respondents were asked for permission to record the interviews. If permission was given, interviews were recorded to assist data collection and analysis\(^1\).

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\(^1\) A Stakeholder Advisory Group was established to guide the development of project within the context of other initiatives occurring in the region, promote the project through their communication channels, and participate in the design, promotion and implementation of regional initiatives based on the project findings. Members of the
Interviews were transcribed and transcripts were coded into a number of emerging themes common across firms engaging in innovative practices. Innovative practices were identified starting with a central question drawn from the OECD’s Oslo Manual for collecting and interpreting data on innovation (OECD, 2005). These themes were supported by the literature review presented in the previous section which focused on the regional context for manufacturing innovation and the enablers of innovative practice amongst SMEs. Emerging themes included: firm’s culture of innovation, human resource management practices, funding of innovation, networks and collaboration and strategic planning, which form sub-sections in discussing the findings from the qualitative research. Interview transcripts were coded thematically by hand using an open coding approach, both through an informal analysis of word-repetition, an analysis of words in context closely related to common themes and through a careful reading of larger blocks of text. Direct quotes are used to support and illustrate findings.

Sample Characteristics

The majority of manufacturing firms interviewed were well established with more than six in ten of the firms having been established for more than 20 years. More than half (56%) of the firms interviewed were medium sized firms employing 11-50 staff. Of the remaining firms, 22% were small firms employing up to ten staff while a further 22% of firms employed more than 50 staff members. Firms also discussed changes to the size of their workforce over the past 18 months. Analysis of the changes indicates:

- Half of the very large firms employing more than 100 employees up to 18 months ago have now reduced their workforce to be under 100 staff members.

- More than half of the large firms previously employing 51-100 employees have downsized to 11-50 employees.

The proportion of medium and large firms who participated in the project was higher than expected in comparison with the Australian Bureau of Statistics Business Count. In particular, there was a significant undersampling of firms with 1-4 employees. This is most likely due to the initial sample being constructed from contacts associated with industry-based membership organisations. There may also be a relationship between the undersampling of these very small firms and under-sampling in the Newcastle area.
- One firm interviewed had finalised their manufacturing facility and opened for business at the beginning 2014. This is represented in Table 3 as growing from a small to a large firm.

- One sixth of participating firms (16%) reported that they had reduced their workforce by more than 50 per cent over the past eighteen months. A further 22 per cent had reduced the number of employees by between 25 and 50 per cent.

Participant responses relating to the type of manufacturing, customer base and business planning were coded to enable analysis based on business profiles.

- Metal manufacturing, metal fabrication and machining were the core services undertaken by two-thirds (67%) of the participating firms.

- The major customer base for six out of ten (60%) of the firms directly included mines or mining support businesses.

- Half (51%) of the participating firms were linked into a global supply chain with the majority of these directly exporting products or services (44%).

- Four out of ten firms (42%) surveyed identified a formalised strategic business planning process which included short-term and long-term planning, and the use of board members and/or external advisors to the business.

Participants were asked to indicate if overall profitability for the business was increasing or declining. More than half (56%) of the respondents indicated that their firms profitability was declining or significantly declining. Analysis was undertaken to identify possible differences in the business characteristics of firms reporting increasing or declining profitability. Reported declines in profitability were highest in small and medium size firms. More than 60 per cent of firms employing less than 50 employees were experiencing declining profitability and this increased to 70 per cent in the smallest firms with less than ten employees. Similarly, declining profitability was reported by:

- more than six in ten metal manufacturers (63%)
- almost eight in ten business (77%) that were not currently part of a global supply chain, and
almost eight in ten firms (77%) that did not have a formalised strategic business planning process.

Findings: Innovation in Hunter Manufacturing

With regard to innovation, firms were asked directly whether they had “developed a new or significantly improved process, service or product in the last 5 years” (OECD, 2005) and were prompted to expand on what these new products or services were and how they made this innovation happen. Firms were further asked to reflect on opportunities for innovation (developing new processes or products) within the firm. Analysis of the interviews indicated that innovation also emerged as an important sub-theme in discussion of the firm’s value proposition (their unique advantage or value in the market place), how the firm utilised networks and collaborations and how firms addressed challenges and opportunities in terms of future business planning. A number of common themes emerged in response to these questions.

Broadly innovation can be divided into product innovation or process innovation. The OECD (http://www.oecd.org/site/innovationstrategy/defininginnovation.htm) defines product innovation as a good or service that is new or significantly improved, such as significant improvements in technical specifications, components and materials, software in the product, user friendliness or other functional characteristics. A process innovation is defined as a new or significantly improved production or delivery method, such as significant changes in techniques, equipment and/or software. Innovation of new products or services was driven internally in some cases but more often in response to customer requests to develop solutions. Once developed, a major challenge was the ability to commercialise and market the product. Innovation of new processes was seen as essential to increase efficiency and in particular, to offset the cost of wages. The majority of participating manufacturers acknowledged the importance of continuing to improve processes. Process innovation was being driven internally, by individuals and/or teams. Automation, robotics and mechatronics were seen as key to process innovation.

Manufacturing has always included a range of activities in addition to production, increasingly service-like activities, such as R&D, marketing and sales, and customer support have become a larger share of what manufacturing companies do (McKinsey, 2012:7; Adams et al., 2014). Providing services can help generate revenues and maintain margins during downturns, as strong service offerings can help improve product sales, with many customers showing a preference for those products with tailored service offerings. Research by PWC (2013:10-11) highlights that products are still the primary focus for innovation amongst many industrial manufacturers and
relatively few have business models, customer experience or access to supply chains at the top of their innovation priorities. An understanding of the importance of marrying new or enhanced services (‘service innovation’) with traditional products can significantly enhance the value of the product delivered to the customers. “The ‘service leaders’ who are able to offer new or expanded services as a real value add – performed better financially with more stable results. Service followers’ who see services merely as an extension of their product portfolio lag behind in financial performance” PWC (2013:11). A shift to the provision of services, complementary to products, was identified in a number of our successful manufacturers, and in one case the shift to a sales and marketing focus represented a fundamental re-orientation of the business model:

“We changed from a manufacturing business that happened to sell, to a sales and marketing organisation that happens to manufacture.”

Culture of Innovation

A culture of innovation was strongest in more profitable businesses; developed through encouraging staff to be creative, identifying new ways of doing things, and being transparent about the results and successes. Creativity is particularly important given SMEs in the manufacturing sector often develop competitive advantage through their staffs’ creative potential to develop differentiated products for niche markets (Terziovski, 2010; Damanpour 1992 and Fuchs et al., 2000). The literature supports the notion that an innovation culture can be fostered systematically, where it becomes second-nature for employees to source innovative solutions to challenges and to engage in continuous improvement (Samson and Gloet, 2014:6461).

“Our innovation culture, what we do, is a way of life, it’s a way people think and engage in the complexity of what they do. It’s an innovation in how you talk internally, present something to a customer. It’s an innovation in a product you see on the internet and think wow I could save $50 on every machine or an hour...our innovation and thought processes on innovation are across every aspect of the company, through to the accountants”

“We think of ourselves much more as an innovation and commercialisation organisation than we do as a manufacturing organisation”

“The culture which you instil in a business has to be apolitical... people wanting to be honest ...and have fun/recognise and reward results, celebrate success be it big or small”

“We innovate across every aspect of the business, packaging, ways of interfacing with the customer, marketing and web-development...we try and develop a culture of innovation”

“We have a good culture of the tyranny of good ideas...every idea gets up and we contest for good ideas”
However successful innovation requires an element of risk and the organisations studied demonstrated an appetite for risk that was consumed within carefully managed boundaries (Samson and Gloet, 2014).

**Human Resource Management Practices**

Amongst successful innovators changes in human resource management practices were highlighted as a key to cultural change which supported innovative thinking, including: encouraging staff ownership of new ideas from the ground-up and ensuring ideas generated by staff had a means to progress to senior management, upskilling of existing staff, a focus on soft skills as well as technical skills, regular leadership updates and transparent and non-hierarchical management structures.

“We really encourage innovation in thinking; encourage staff to bring forward ideas - be it big or small, silly or not so silly - both over the external sales team and our internal operations”

“The soft skills are always the issue. When I was a lad and graduated I was an engineer and that’s what I did – you wrote your report, handed it to the typing pool, the typing pool typed it and you handed it to your bosses – there was all of these processes. Now we expect everyone to do everything, marketing, sales and do everything on a budget…”

“It’s taken three years of solid work from a human-resource, marketing, innovation point of view. People are looking for a way to fill their order book; the reality is that it takes a financial and emotional commitment of all people involved”

“We don’t have a skills gap… where we need skills we encourage our employees to get in and do new things”

Samson and Gloet (2014:6456) identify that leaders/managers can provide direction and focus, acting as role models for innovation across their workforce and operations, and in taking a hands-on approach to innovation activities. They can promote innovation by measuring it and provide recognition and rewards to staff for contributions to innovation. Such innovativeness is attractive to labour market participants, allows these organisations to attract and retain talented people. Research shows that performance effects are amplified when bundles of high performance work practices, improving employees’ knowledge and skills, motivating employees to perform, and providing employees with the opportunity to contribute to how their work is done, are deployed as a system (van Wanrooy, 2014; Centre for Workplace Leadership, 2014).

Howell (2005) also identifies that champions - individuals, often middle-level management or lower, who promote an idea with conviction, perseverance and energy - can be key to innovation
speed and success. The importance of champions in driving organisational change was supported in our findings.

“We had a handful of people creating a negative environment...we didn’t engage with the naysaying and negativity, because when you are right, you are right...you’ve just got to get in and champion it through”

**Funding of Innovation**

Funding of innovation was consistently raised as a challenge. In-house driven innovation required cash flow within the business or access to research and development (R&D) grant funding. Customer driven innovation enabled businesses to charge customers in the first instance however additional funding or cash flow was then required to expand from a customised product to a commercial product. Manufacturers recognised that innovation required investment in research, skills and equipment, however also discussed the need to be able to increase orders to maximise the investment and recoup costs. Process innovation was seen as less risky than product innovation.

“With new products there’s obviously got to be demand for a new product, we don’t want a great product sitting on the shelf that doesn’t sell”

Access to R&D grants has been crucial for many businesses however the entry criteria and administration requirements often resulted in funding applications being ineligible or difficult and costly to manage. Suggestions were made for government and industry to support businesses prepared to take risk and foster innovation within manufacturing. Development of new products supports businesses to expand and generate new employment. Support from government could include tax breaks, low or no interest loans, and grants.

Issues of intellectual property (IP) and patents were raised by a few participants. Process for patent approvals can be time consuming and confusing. Several manufacturers indicated that they did not seek to patent new innovations as speed to market for new products was more important.

**Networks and collaborations**

“Most innovations do not go down a pipeline. Instead, they form in a network.”


Participating manufacturers agreed that networks and collaborations were a critical aspect of their business. Collaboration was seen as a key to innovation including within work teams, with customers and with research organisations. Collaboration with TAFE, universities and other research organisations provided access to skills, technology and potential sources of employees
to foster innovation within businesses. The literature supports the notion that a firm’s range and depth of external relationships reflects the overall innovation focus of the business, as well as being a source of innovation through the provision of new ideas, knowledge and skills. Innovative organisations generally partner with customers looking for innovative solutions, and who are prepared to pay a premium for such innovations. Collaboration is also an important part of building international linkages, and developing potential linkages to global value chains (CEDA, 2014). Innovative companies often work with their supply chain partners to extend their innovation efforts over a broader asset base (Samson and Gloet, 2014:6456).

“I’ve made some friends in the rubber [supplying] industry which have been useful...our supplier ended up giving a lot of good advice, other people have been very useful in giving me a lot of hints with no reward for them... and of course we’ve put in some late nights out there and thrown away a lot of rubber”

When asked about networks or collaborations that have been particularly useful a broad range of responses was given. Relationships with customers and suppliers were seen as the most important collaborations, with ongoing communication with current and previous customers a priority for most.

“A couple of recent R&D successes have actually been done in consultation with a customer...we’ve been a bit blessed in the respect that we’ve won a couple of those customers, we were up against some competitors, based on our ability and commitment to R&D and we’ve worked with the customer”

Collaboration with other businesses in their industry sub-sector and businesses located in the same geographic area was also important including collaboration with competitors. Some metal manufacturers identified these collaborations as a way to continue to operate in a declining market while one participant identified collaboration with other businesses as the key to his strategic business model.

Industry-based organisations and government agencies were identified by many participants as providing or having the potential to provide positive networks. Organisations such as Ai Group, Hunternet, Hunter Business Chamber, Austrade and NSW Trade and Investment were most often discussed in terms of their ability to identify new markets and customers, and to assist businesses in obtaining new orders. Priorities nominated by participants for Hunter focused organisations were the promotion of Hunter based businesses to national and international markets, attracting major projects and contracts to the Hunter, and lobbying State and Federal governments regarding the importance of awarding government contracts to Australian-based companies. As a secondary
role, these industry organisations were viewed as important to providing networking opportunities amongst locally based businesses.

Feedback related to engagement with industry-based organisations included:

- Most participating businesses have successfully utilised industry-based organisations that provide employee relations and broader human resource advice.

- Some benefit has been gained from exposure to major projects and trade missions to regional and overseas areas, however few identified these contacts as resulting in new or increased orders. Participants were more likely to mention benefits including exposure to other local businesses participating in the activity, as well as information about local and global trends.

- Additional assistance from industry organisations to complete government business and industry accreditation requirements would be beneficial, including grant applications, Workplace Health and Safety (WHS) requirements, training and standards certification.

- Concerns were raised about the ability of member-based organisations to support new member firms or smaller firms. Some participating manufacturers felt that the level of support and exposure to potential business opportunities did not match the cost of membership.

- A few of the manufacturers have developed positive networks with universities and research hubs, while the majority indicated that they did not know how to go about developing these relationships. Future initiatives suggested by participants included development of business-research hubs and opportunities and assistance in developing links with universities and research organisations.

Strategic business planning

“For albeit a small business, there is a whole lot of corporate discipline in place around market strategy and planning and measurements and board meetings, with key financial results presented and analysed”

The literature has identified that innovation success starts with strategy and leadership, in which innovation is prioritised (Samson and Gloet, 2014:6456; Terzivoski, 2010). The interviews held with Hunter based manufacturers indicated that less than half of the businesses
surveyed had a formalised strategic business planning process. Further analysis identified that a lack of strategic planning was associated with declining profitability. Businesses that did have formalised processes were more likely to be experiencing steady or increased profitability.

Insights gained from this research that highlight the important role of business planning included:

- Businesses with formalised strategic plans were able to identify major competitors, market drivers, and short-term and long-term opportunities and goals.
- More optimistic businesses reflected strategic planning processes that benefitted from input by internal management teams, boards with independent board members and/or external advisors to the business.

**Opportunities for the Future**

Participants were asked for their ideas on what could be done collaboratively in the region to support Hunter manufacturers over the next 5 to 10 years. In suggesting potential regional strategies many interviewees highlighted the need to attract funding and provide greater financial support. A high priority was attracting major projects to the Hunter, including large infrastructure projects and contracts supported by better marketing opportunities across both global and local markets. Incentives and support for businesses from government and major industries, especially for the development of new industries and encouraging diversity across industries, were also identified as a necessary step forward in securing the viability of the region’s manufacturing base. Suggestions were made for government and industry to better support businesses prepared to take risk and foster innovation within manufacturing - support from government could include tax breaks, low or no interest loans, and grants.

While attracting major projects to the Hunter and encouraging government contracts to be awarded locally were regional strategies for future growth favoured by metal manufacturers, the focus for non-metal manufacturers was on innovation through collaboration with universities, research-business hubs and access to funding for R&D. Recent Australian research drawing on an international evidence base highlights that an effective regional innovation system needs to include business, consultants and research institutions that keep pace with new knowledge and technology, while at the same time adapting to local needs (Connell *et al.*, 2014). Concentrations of inter-connected companies and institutions which are co-located and gain advantages through their co-location are referred to as industry clusters (Porter, 1998).
Industry clusters with strong local and global business networks can provide mechanisms for firm interaction (Ewers and Malecki, 2010) and foster competitive advantage (Simmie, 2008). In building greater university and business linkages another way forward may also be to establish a scholarship or other mechanism to support embedding third year or honours university students in firms. Discussion regarding innovation clusters and training also noted opportunities for increased development of the Hunter Region’s mechatronics and robotics skill base. Increasing membership of the Ai Group/HunterNet Innovation Cluster and linkages with the University of Newcastle’s Engineering Faculty, including its mechatronics research, and the Hunter Institute’s robotics section, are seen as fostering this. Ai Group will be seeking the assistance of the NSW government to recognise the Hunter as a ‘‘Global Centre of Engineering Excellence’’ and to provide us with the funds for an international marketing campaign. Thus a key outcome from the project was a shared vision for a Hunter Manufacturing Region where firms are hooked into diverse global value chains, with an international reputation for quality, reliability, design and customer service. In this vision, collaborations and partnerships between firms, and research and training hubs generate a culture of innovation, and a highly skilled workforce underpins the Hunter’s sustainable economy.

Incentives for increased employment and skills training were also commonly highlighted as a necessary regional strategy. A comparison of innovative and non-innovative firms indicated a willingness to improve staff knowledge, skills and abilities as an important internal factor in developing an innovative organisation. However, increasing employee training and skills were believed to be aspects which could be better supported externally by government and major industry. Interviewees, and our analysis of profitable and non-profitable businesses, also highlighted the need for further skills development particularly around business planning, marketing and innovation. There may be benefit in a business mentoring program, especially around strategic planning, human resources management and fostering an innovation culture. In its ‘High Performance Manufacturing Workplaces Study’, the Centre for Workplace Leadership (2014) outlined a number of specific initiatives which may assist business in this regard, including the provision of technical information and guidance as to how to implement better business and human resource management practices, dissemination of best practice case studies, incentives to support training for managers in SMEs and the development and maintenance of business information networks to “share information, engage in problem-solving and collaborate in best practice in work processes” (Centre for Workplace Leadership, 2014:9).
Industry based support may also assist businesses facing significant declines in profitability and increasing market competition to undertake critical business reviews and planning. Given the current high levels of competition in general metal manufacturing, some regional consideration should be given to supporting businesses that may need to exit the market.
References


Appendix 1

Thank you for agreeing to this interview, and for your contribution to the project.

The Hunter Valley Research Foundation (HVRF) is collaborating with key stakeholders to develop targeted regional initiatives that will support increased competitiveness of the Hunter’s manufacturers. The outcomes of this work will include clear recommendations for policy makers and insights for individual organisations to use in their future business planning.

The purpose of the current interview series is to understand how Hunter manufacturing firms are taking on the challenges to remain competitive and what are the barriers.

[Provide information about HVRF; Confirm recording interview to assist with documentation]

Main questions in bold

- Dot points provide areas to be covered and additional prompts

1. **Could you please tell me first a bit about the firm?**
   - how long it has been in operation
   - main activities
   - number of staff
   - ownership (locally owned, overseas/multinational, board, shareholders)
   - what is happening with your profitability, is it going up or down
   - prompt for an annual report

2. **What would you describe as your key products and services?**

3. **Which of these do you think gives you a unique advantage or value in the market place?**
   - Prompt for unique skills, products, services; core capabilities

4. **Who are your customers? Where are they located?**
   - Have you looked at other domestic markets?
   - Have you looked at overseas/international markets?
   - If yes but not currently exporting, why not?

5. **Has your product and service mix, or your customer base, changed over the last five years?**
   - If yes, how have they changed?
   - E.g. how have your activities changed; how has the nature and location of your customer base changed?
6. What changes have there been in your supply chain in the last five years?
   - How have these impacted the firm?
   - Where are your major suppliers currently located?
   - Are you currently well positioned within your supply chain?

7. Who are your major competitors and where are they located?

8. What do you think is driving current competition in the market?
   - Prompt for differences between local and international markets e.g. price, quality, service orientation, timeframes, technology, innovativeness?
   - What is the major issue threatening your ability to remain competitive in the local and (where applicable) international market?

9. What have been the main challenges over the last five years and how has the firm addressed these?  (prompt for the following)
   - number and composition of staff
   - skills mix needed, availability of required skills, access to training
   - marketing services of products
   - need for further investment or access to capital
   - changes in processes

10. Have you developed new or significantly improved processes, services or products over the past five years?
   - What were these? How did you go about making this happen?
   - Are there opportunities/other opportunities within your firm for doing things differently or developing new products?

11. How does the firm address challenges and opportunities for doing things differently within your future business planning?
   - How far into the future do you plan for?
   - Do you have a formal business plan?
   - How was that plan developed? Information used to inform planning; in-house input or advice; use of outside expertise/skills; customers; suppliers?

12. Are there particular networks or collaborations that you have found useful?
   - What were these and how did they provide support / opportunities?
   - Prompt for awareness of HunterNet, Ai Group, NSW Trade and Investment, AusIndustry, Austrade, Business Chambers, industry clusters and hub
   - Opportunity to provide relevant contact details or information about upcoming events such as the Summit, HVRF Breakfast, etc
13. What is the best thing we could do collectively as a region to support Hunter manufacturers over the next 5 to 10 years?

14. Is there anything else you would like to add about the challenges or successes the firm has had in recent years, or comments about the future competitiveness of local manufacturers?

Thank you for your time today. Your insights will be collated with insights from other firms participating in the interview program and inform the development of targeted initiatives to support increased competitiveness of the Hunter’s manufacturers.

This is an ongoing research project and may include follow-up interviews at a later date (face-to-face, phone or via email). Would it be ok to get back in touch with you?

Can you suggest any other firms that I could interview as part of this project?
Title: Design for the old and you include the young - revitalising urban design in regional Australia

Nigel Cartlidge: Doctoral Graduand, Faculty of Society and Design, Bond University, Gold Coast, Queensland, Australia

Lynne Armitage: Associate Professor, Faculty of Society and Design, Bond University, Gold Coast, Queensland, Australia

Daniel O’Hare: Associate Dean, Faculty of Society and Design, Bond University, Gold Coast, Queensland, Australia

Abstract

The eminent Professor of Geriatric Medicine, Bernard Isaacs (cited in Giles-Corti et al 2008) said, Design for the young and you exclude the old; design for the old and you include the young. This would appear to be a useful design principle for all public spaces, but especially those with the restorative qualities found in even modest, naturalistic settings in urban areas (Kaplan and Kaplan 2011). A restorative network of walkable routes and destinations in regional towns could be influential in creating a sense of well-being and improve their attractiveness to the 65 years plus demographic set to become nearly a quarter of the population in coming decades.

Walking, as a human activity, is linked to the evolution of our senses and should not be regarded as just a movement mode (Nicholson 2008). Walking has, in fact, helped to mould our societies and cultures. It has played a significant role in the fields of philosophy, spirituality, sexuality, literature, history, science, politics, the design of cities and many other fields (Gros 2009).

This paper examines the need for regional and local councils to reorient their urban design and planning policies and practices to focus on the many benefits of walking. There is more to walking than active transport and more to active transport than cycling. Or as Jan Gehl observed: We have a department for roads, why not a department for pedestrians? (Bennett 2015).

Keywords: Built environment, Restorative environment, Healthy Cities, Urban design guidelines, Urban planning, Walkability.
Introduction

Regional and rural Australia has faced many challenges in attracting populations to sustain the level of services that many capital city residents take for granted. With low relative net population growth in regional Australia and a continuing drift to capital cities and coastal regions, maintaining the attractiveness of regional towns is seen as a key initiative for their sustainability. Garnett and Lewis (2007: 41) observe that low population growth in inland and remote regions is associated with falling employment growth rates, lack of amenities and services. They also noted that population changes in coastal regions may be influenced by amenity and lifestyle choices and comment that these non-labour market explanations could also explain a small outward migration from cities to the inland and remote regions of Australia.

The population of Australia is expected to increase to between 36-48 million people by 2061. It is also expected that the percentage of the population aged 65 years and over will increase to 25% by 2061 with particularly rapid growth in the number of people over 85 years of age and life expectancy rising to 92.1 and 93.6 years for males and females respectively (Australian Bureau of Statistics 2013). This means that there will be around 9-12 million people over 65 years by 2061 representing a significant social, economic, cultural and technical potential for regional towns and regions. This age group is by no measure a homogenous one. It will contain different generations and have diverse expectations and preferences for an over 65 lifestyle that councils need to begin to incorporate into their plans, policies and programs (Humpel et al. 2009).

The attractiveness of coastal, regional and inland towns and communities for a population that will be less likely to be driving, for reasons of lifestyle changes and more likely to be walking or using public transport, has not been a subject of much academic research, although how and when they will retire or move into phased retirement has received some attention (Humpel et al. 2009). Australian population growth is not consistent across capital cities or regional towns: some regional areas are growing and others have a declining population with little research into either the reasons or implications of these population dynamics (Jackson 2004).

The State of Australian Cities 2014-2015 report indicates trends for older people to move out of the city to middle and outer suburbs. Along with this trend, there is evidence that there is an uneven distribution of people over 65 years in regional cities and towns. Growth of this demographic is expected to be greater in non-metropolitan cities and along a belt of towns from the Victoria/New South Wales border to Queensland’s Sunshine Coast (Atkins et al. 2015: 24).

This paper will concentrate on the opportunities an increasingly important, over 65 years demographic presents for improving the competitive level of attraction of regional towns for people from metropolitan areas. The authors propose that the potential for increasing the attractiveness of those towns can be led by focusing on walkability in the urban design of the public realm. This would also involve turning the negative narrative of the burden of ageing populations (Guest 2009) into a positive narrative of opportunity to support growth, quality of life, wellbeing and sustainability of regional towns for all its residents. This approach would be dependent on the ability of local leadership to adopt land use regulations and planning to favour changes to liveability of those regional towns and communities.
The eminent Professor of Geriatric Medicine, Bernard Isaacs (cited in Giles-Corti et al 2008) said, *Design for the young and you exclude the old; design for the old and you include the young.* This would also appear to be a useful design principle for all public spaces, particularly those locations in the public space network that possess social, cultural, recreational and restorational values that allow people to access their benefits through the activities, amenities and facilities found in them.

The reason for this focus on is largely because, as people get older, they will either reduce or stop driving altogether (Fildes *et al.* 1994). Walking as an activity will be essential to maintain well-being for this age group, along with public transport to access the goods and services they will require for an active healthy lifestyle (Robertson *et al.* 2012).

The walking environment of contemporary Australian towns and cities should be reconsidered from the perspective of those who will not be walking as transport but walking as part of a lifestyle to meet their needs and preferences for exercise and mobility (Garrard 2013: 9). In meeting these needs, locations with the restorative qualities found in even modest, naturalistic settings in urban areas (Kaplan and Kaplan 2011) could be influential in creating a sense of well-being and improve their attractiveness to the 65 years plus demographic set to become nearly a quarter of the population in coming decades. By creating a network of destinations such as parks and joining them with tree-lined streets, people will be enticed to walk for enjoyment and reduce stress.

This paper examines the need for regional and local councils to reorient their urban design and planning policies and practices to focus on the many benefits of walking. There is more to walking than active transport and more to active transport than cycling. Or as Jan Gehl observed: *We have a department for roads, why not a department for pedestrians?* (Bennett 2015). A strategy of improving urban design through the prioritisation of walkable routes, environments and destinations is seen as an inexpensive approach to revitalisation and renewal that can distinguish a regional town as a desirable place to live.

**Demographic Change, Opportunities and Challenges**

Steve Wozniak (b. 11 August 1950), Bill Gates (b. 28 October 1955), Tim Berner-Lee (b. 8 June 1955) and many others of their generation shaped the modern world of computing and technology. This generation is about to retire, or at least change lifestyles in the coming decades that will see the Australian population rise and the percentage of older people in it grow to 9-12 million by 2061 (Australian Bureau of Statistics 2013). To put this in perspective, this is nearly a half of the current population of Australia. It would be a mistake to see the age group who are retired or will retire soon as homogenous (Tight *et al.* 2004). The over 65 age group as a demographic will encompass different generations who have radically different life experiences, world views and expectations.

The use of mobile technology, internet and social media will not be alien territory to the succeeding generations of people who are set to retire in the period up to 2061. In the next 45 years nearly all the people categorised in Figure 1 will be retired. They are likely to look to live in places that match their preferences for changing lifestyles. Although there are different patterns of use amongst the different age groups, the graphic is evidence that all age groups who will retire in the coming decades are using technology to suit their lifestyles, build social networks and guide decision making processes.
Place branding (Sager 2011) and the concept of people moving to places to suit changing circumstances and lifestyles is not new. Sea-change and Tree-change (Carter, Dyer and Sharma 2007) and the movement of the creative class (Florida 2005) to cities that were attractive to live and work in are part of the narrative of contemporary urban planning. What is new is the social environment in which this will take place in. Trip Advisor™ and other web sites are used by people to search for lifestyle destinations not just for holidays (Cohen 2011) and, as popular television series like Escape to the Country™ illustrate, trips for holidays are often a precursor for the desire to move to a new less stressful lifestyle from cities.

The attractiveness of different towns and communities in regional Australia is dependent on many factors including the relative cost of living, employment prospects, the quality and availability of education, health services, sporting, recreational and entertainment opportunities (Community Services Victoria 2015). Tonts, Plummer and Argent (2014) also suggest that local leadership, regional development policies, land use regulations and planning are also important factors in the evolution of resilient rural economies.

Badland et al. (2014) tentatively identified 11 domains of liveability. These include factors such as crime and safety, the natural environment, public open space, transport and social cohesion. These factors are all associated in the academic literature with health and wellbeing. Badland et al. (2014: 70) also found considerable evidence for the association of walkability with health outcomes. The Australian government is also concerned with the nature of the liveability of the cities and towns in the different states across a range of issues associated with health and wellbeing (Australian Government 2012).

In order for regional towns and communities to adapt to changing demographics, it is proposed that they should adopt an urban design strategy of public spaces for people similar to that that which has
led to the revitalisation of some cities (Adams et al. 2004). Melbourne, for example, applied a strategy that included the promotion of urban design outcomes and active transport in the form of cycling and walking. However, evidence shows that improving cycling largely benefited the section of the population that included the young and middle aged planners who were promoting it (Mees and Groenhart 2012) and discouraged the use of the streets by older people (Victoria Walks 2014).

The car dependent cities of Australia (Dodson and Sipe 2005) will face significant age related challenges adapting to the infrastructure and public transport needs of the over 65 years demographic (Atkins et al. 2015: 24). However, regional towns with their often pre-car town centres have an opportunity to provide the mix of walkable street networks combined with responsive transport planning that could more closely match the preferences of older Australians to remain independent and live a healthy lifestyle (Olsberg and Winters 2005). Regional towns may also be a better lifestyle match for older Australians. Since the advent of the Garden City, towns with a population of around 30000 have long been seen as the preferred size to support walkable lifestyles with a range of supportive activities, facilities and amenities (Howard 1902).

**Shaping Healthy Built Environments through Walking to Support Lifestyles**

There is a long established narrative of walking for a healthy lifestyle that has had a significant effect on the form of towns and cities. This originated with the 19th century creation of many of the much loved parks and nature-oriented streets that connect them. These were created largely as a reaction to the crowded and unhealthy conditions of the rapidly growing industrial towns and cities of that period. Frederick Law Olmsted (1822-1903) is associated with both the conception of the parks movement and the origin of the profession of landscape architect. Olmsted (1870) designed New York City’s Central Park and related parkways in Brooklyn, with the intent to provide *relief from the stresses of urban life*.

Olmsted (1870: 30) was a keen observer of people and walking, drawing clear connections between the allocation of public space to parks, of varying sizes connected by parkways with the ability to *maintain a temperate, good natured and healthy state of mind* in towns and cities. This concept promoted by Olmsted (1870: 34) is responsible for some of the best loved places in towns and cities around the world. Olmsted (1870) also explicitly valued the allocation of public space for the creation of parks, parkways and green streets over the values that came from developing towns and cities for transport and economic purposes that is the main focus of many planners (Hall 2002).

Walking, as a human activity, is linked to the evolution of our senses and should not be regarded as just a *movement mode* (Nicholson 2008). Walking has, in fact, helped to mould our societies and cultures. It has played a significant role in the fields of philosophy, spirituality, sexuality, literature, history, science, politics, the design of cities and many other fields (Gros 2009).

Seeing the world from the perspective of walking rather than driving or riding is likely to become the dominant outlook of at least a quarter of the nation’s population in coming years. This change of view presents an opportunity to shape our towns and cities in a manner which has been part of the relationship between people and place for as long as we have been a species. In so doing, places may be created with enduring value that will attract people who have the choice of where they want to live. In a connected world the reputation of being a walkable, attractive city is likely to be influential in making decisions for selecting appropriate lifestyle destinations to retire or slow down.
Walking has been associated with physical and mental health throughout our history (Ward Thompson 2011). From the development of walks within the castle walls, cloisters and corridors of palaces, the way walking has shaped places has been associated with the preferences of the dominant cultural groups in society. In a Renaissance garden, walking, standing and sitting were the perspectives required to appreciate the ordered statuary, fountains and plantings. A garden was a place that according to Pliny (23-79) was for seclusion, serenity, or relaxation, the opposite of the idea of busy urban life. A garden was a place to think, relax, and escape (cited in Attlee 2006: 13).

The Renaissance garden evolved to the larger Baroque garden where people with time for leisure could enjoy cultivated landscapes. Renaissance and Baroque gardens were the preserve of the nobility and wealthy: they were walled to exclude others, although the owners could walk for a mile without reaching the wall, as at Hampton Park, U.K. (Solnit 200: 87). However, walls also restricted the views to the surrounding countryside; the innovation of ditches hidden in the landscape, known as the ha-ha, meant that the owners of the gardens could view beyond into the landscapes surrounding their palatial homes.

Gardens continued to designed and developed to be experienced by walking through them, with walking and viewing becoming linked pleasures (Solnit 2000: 90). Eventually the romantic poets such as Wordsworth (1770-1850) rejected the experience of walking in artificially shaped gardens, and popularised rambling in natural scenic landscapes. In the process, the growing middle class were inspired to experience rambling (Solnit 2000: 102) and created an industry of natural tourism and favoured landscapes, that in turn also led to the creation of national parks, which, not insignificantly, was also a passion of Olmsted’s (1865). This powerful cultural relationship between attractive green cities and scenic landscapes continues as a linked narrative that drives not only tourism but lifestyles.

Although the design elements found in the gardens of the nobility and wealthy are not a usual feature of urban landscapes beyond town parks and a few botanic gardens, the concept of creating natural environments within the urban, to relieve the stresses of urban living, remains a very important element of the attractiveness of localities, neighbourhoods, towns and cities. Kaplan (1995: 173), in describing the elements of a restorative environment, asserts that the properties of a natural environment can be reproduced in smaller, more managed environments where miniaturisation of the elements of natural settings can provide a feeling of being in a different world (Kaplan 1995: 174).

From Pliny (Attlee 2006), who identified the pleasure of a private ordered space that connected to nature and culture, to Wordsworth (Solnit 2001) and Olmsted (1870) who created a narrative of a walkable public space that sought to bring nature into the urban environment, there has been a philosophical and social narrative of people’s connection to nature as a cultural imperative for living in towns and cities. Since the advent of vehicles, there has also been a linked narrative that has concerned the allocation, arrangement and provision of public space for the economic imperatives of transport to the activities, amenities and facilities of urban life (Fishman 1982).

The decision to prioritise the movement of vehicles over people walking has had an effect on the fabric of contemporary cities that can be traced from the rapid rise of industrial urbanisation up to today. Olmsted (1870) reacted to the precedence of traffic in the new towns and cities by proposing tree-lined streets that favoured walking between valued places such as parks. Sitte (1898) was
dismayed by loss of public life in the streets that he associated with the plain and monotonous character of cities produced by modernist planners. The new urbanists in America sought to address the *geography of nowhere* (Kunstler 1994) of car-oriented development by proposing a return to the urban design and planning of older, traditional walkable neighbourhoods (Congress for the New Urbanism 2000).

Cultural and societal changes have continued to act on the practices of urban design and planning. However, the physical and mental health benefits that can be gained from an environment that supports and encourages walking, remain a constant narrative. The preferences of the generations set to become walkers over the next few decades need to be understood if the expectations of the wealthiest, most educated and informed generations in the history of Australia (Hugo 2003) are to be met by the leaders, designers and planners of regional towns and communities.

Rather than focusing on the design of public space for transport purposes, it is suggested urban designers and planners concentrate on designing the public realm for the use of an increasingly larger demographic who will be using their neighbourhood network of routes and destinations for social, recreational and restorational walking. Locations, precincts and neighbourhoods that allow walkable and egalitarian access to activities, amenities and facilities found in the public realm will then be created. In turn, as suggested by Bernard Isaacs, the needs of the young will also be met (Giles-Corti et al 2008).

We now move on to propose a model that can be used in combination with a typological analysis of the values, uses, activities and amenities of place (Cartlidge 2015: 43) for both the analyses of existing places and a method to create urban design guidelines, policies, plans and programs for the revitalisation of urban design in regional Australia. These guidelines will allow all its residents to access the activities, amenities and facilities of those towns through the creation of a dense network of walkable locations, designed for the local values of place.

**An Urban Design Model for Egalitarian and Walkable Places**

> To an energetic child, a flight of stairs is a link between two floors, an invitation to run up and down; to an old man it is a barrier between two floors, a warning to stay put.

(Tuan 1977: 52).

It is through the perspective of the experience of place that Tuan (1977) explains that the use of places in the built environment are dependent on the abilities and perceptions of the user. Designing for egalitarian use of the public realm of towns is dependent on the urban designer and planner achieving a network of routes and destinations that extend from the home (Brookfield *et al.* 2015) to every potential activity, amenity and facility in the locality, precinct, neighbourhood and town (Mace, Hardie and Place 1991). These routes and destinations need to meet the needs of all people regardless of age, gender, mobility or perception. Any design, plan, policy or program that favours the active adult male in its design is likely to discriminate against other users (Mace *et al.* 1991).

If the urban design of place is to be egalitarian, walkable and accessible for all, it is postulated that it should be oriented towards the needs and desires of the walker, in particular, the walkability of the locality and, in valued places, towards the degree of public access to the social, cultural and restorative environments found in those places. However, as Fitzsimons *et al.* (2010) observed, there
is no professional agreement on the different characteristics of the built environment that contribute to the walkability of a place. This in itself is symptomatic of the nature of walking and of the conflict for the control of public space allocation that are the areas of concern for the different fields that create and govern walkable spaces and places for different purposes (Zacharias 2001).

Designing for the earnest purpose of transport to places solely for the purposes of accessing goods and services will remain important. However, creating transport routes linking those purposes unintentionally focuses the designer and planner of the public realm to hurry people along and not allow them to stop, rest or linger. This devitalises the public space and reduces opportunity to socialise. If towns and cities are to design for all their inhabitants, then the urban design and planning of the public realm should take into account changing demographics and lifestyles if they are to be healthy, lively, safe and sustainable (Gehl 2010).

Adopting a value-relational urban design model for the networks and destinations of regional towns can incorporate the values of a changing demographic and meet the preferences and expectations of people for a sustainable and active healthy lifestyle. It can also provide the constraint boundaries by identifying the inherent values of localities and precincts for purposive use of places related to those values (Carr et al. 1992). This would mean that places would be designed according to the nature of their values to society as a whole, and not just for the sake of well-worn, professional practices and narrow sectional interests.

A Value-Relational Urban Design Model for Egalitarian and Walkable Places

In proposing a value-relational urban design approach to the creation of urban design guidelines for places that prioritise walkability, the authors specifically prioritise walkability as the peak value, with the objective of making public access to the activities, amenities and facilities of public places walkable and egalitarian. The prioritisation of these values will necessarily make the other values of place subordinate to this objective. In doing so, this will allow the urban design practitioner to adopt a responsible (Haas and Olsson 2014) and responsive (Bentley et al. 1985) ethical position to the design of public space.

This paper argues for the creation of a value-relational role for urban designers as representatives of those groups in society who are less likely to be involved in the political process of the production of the policies, programs and practices of urban design and planning. However, it is recognised that without the support of government in mandating this role and its paradigms (McGlynn 1993), the current design and planning processes are likely to continue to prioritise active transport as the priority use of public space.

The process of the production of spatial plans that progress from general or diagrammatic plans of regions and towns to detailed blueprints for precincts or buildings is a top down process embedded in planning practices is known as the survey-analysis-plan method (Hall 2002). The authors would argue for the survey and analysis stages to include an examination of the values of the locations within the network of the public realm of towns, thus reversing the direction of planning from detailed plans to spatial plan general summaries. The proposed process for designing the network of routes and destinations of the public realm is to identify the place values of locations that are being used, or have the potential to access activities, amenities and facilities in the precincts and the routes that join these places within the locality to the wider precinct and beyond.
A model of urban design, intended for the production of urban design guidelines from the value-relational analysis of locations, has been developed (Figure 2) from an analysis of international and Australian urban design guidelines (Cartlidge 2015: 137) and the requirements for a restorational place (Kaplan: 174; Cartlidge 2015:162). The best practices of urban design and the values of restorative environments are thereby combined in a synthesis that addresses the attractiveness of the network of routes and destinations. This will encourage walking in a contemporary replication of Olmsted’s (1870) approach to the design of cities and towns where an active urban connection with nature is created for the purposes of promoting healthy lifestyles for all (Maller et al. 2008).

The structure of the model rests on a base of the urban design principles of inviting, comfortable and secure and their associated attributes. These principles support the peak urban design principles of governance and accessibility and their associated attributes. Walkability is the most important attribute and is the focus for the peak urban design principle of governance and accessibility. The peak political values of the model create a simple political mission statement applicable to any locality or precinct for a walkable and egalitarian public access to the activities, amenities and facilities found in valued places. This mission statement can be modified to suit local political and cultural values.

Figure 2: An urban design model for egalitarian and walkable places (Cartlidge 2015)

The research also indicated that the walkability of a place is an attribute of urban design that is both a characteristic of walkable places and a political and place value of those places (Cartlidge 2015). Without understanding how people value, use and relate to different places it is not thought possible to design, plan and develop them so that they may functionally reflect the role they play in people’s lives (Carr et al. 1992).
Balanced along the political platform are the values most associated with each location that include their local topophilic (Tuan 1974) and natural biophilic (Wilson 1984) attributes. They include the value of a walkable precinct for all; the local values created by topography or history; the physical values of climate and the opportunity for physical activity associated with the place; the emotional values associated with the formation of a sense of well-being; the social value associated with places and their activities, amenities and facilities, such as social clubs; the cultural values associated with places, such as the historical artefacts or, in Australia, their customary use by aboriginal traditions; and the natural values of a place, such as the parks and gardens or street trees, their environmental values and the presence of restorative landscape elements.

In applying the model to the creation of urban design guidelines for localities and precincts, it is recognised that urban design is a political-cultural process (Hayden 1995) and that politics is the way that society organises the production of the built environment to suit the cultural intent of society’s dominant groups (Cuthbert 2007). If urban design is to meet the needs of all the social and demographic group of public space, then the role of good design is to understand and incorporate the most important values held by those users (Carmona et al. 2001). The design process must identify the winners and losers in the production of public spaces and places for access to public goods, especially when the public goods are as valuable to society as a whole, as they are in the public realm (McGlynn and Murrain 1994).

Conclusions

An active and aging population will alter the demographic landscape in the next few years. They are likely to want to live in walkable localities and neighbourhoods, and they could resurrect walking for social and pleasurable recreation, as they will not be rushing off to work. To help make that happen, urban designers and planners need to start to provide inviting, comfortable and secure streets specifically to meet the needs of the walker.

With changes to population demographics and the opportunity to work from anywhere with good internet connections, regional towns could position themselves as destinations for people who have a choice of where to live. Walkability will play a significant role in creating the desirable characteristics of towns as lifestyle destinations with a high quality of life. There have always been centrifugal and centripetal forces acting on towns and cities in terms of enticing or deterring population movements. This is driven by many factors including the attractiveness of places that meet the lifestyle preferences and expectations of different groups of people.

However, there is not a substantial body of research into the preferences and expectations of the different generations poised to alter the demographic nature of Australian cities, towns and communities in coming decades. This paucity of research may be due to lack of funding, a lack of political will to address the issues of an ageing population, or the time it takes for academic research to be initiated, funded and published. However, it is reasonable to propose that the different degrees of attractiveness of coastal, inland and remote regions to an ageing, largely metropolitan, population over the next decades, will determine the decisions of that population to either stay put or move to places that they perceive as meeting their lifestyle preferences.

Regional towns and communities that fail to respond to these preferences for amenities, services and the quality of lifestyle expected by the succeeding waves of retirees are likely to lose out to
those that actively respond to the challenges and opportunities presented by a changing demographic (Beer and Keane 2000). This paper suggests not only a model for the urban design of regional towns to respond to the challenges that lay ahead, but a value-relational approach to urban design and planning. This approach will respond in a timely fashion to the needs and desires of different demographic groups in society, meeting the requirements of all by designing walkable places using the values of the locations for accessing activities, amenities and facilities.

References


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Long-Distance Walking Tracks: Offering Regional Tourism in the Slow Lane

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ABSTRACT: Nature-based destination tourism has witnessed substantial growth in recent years, particularly in Regional Areas. This type of tourism is for people who do not want to merely passively view scenic landscape but to actively immerse themselves within it, for example by undertaking long-distance walks. Many tourism agencies and local governments have responded to such demand by developing, branding and promoting ‘walking products’; overseas examples include the UK’s Pennine Way, the USA’s Appalachian Trail, Peru’s Inca Trail and New Zealand’s Milford Track. In Australia, enthusiasts can tackle the Overland Track and South Coast Track (Tasmania), Larapinta Trail and Jatbula Trail (Northern Territory) and Thorsborne Trail (Queensland), among others. Such products offer benefits to visitors in terms of healthy exercise undertaken in stunning scenery, along with enhanced awareness and appreciation of the natural environment. Local governments, commercial tourism operators and land conservation agencies within whose purview such walks are located, derive economic benefits in terms of increased employment and/or income with minimal outlay in the development of the walking tracks. In this paper we review trends in consumer behaviour driving demand for such products; describe a proposal for a new long distance walking track in the Greater Blue Mountains World Heritage Area in New South Wales; and consider potential regional economic benefits arising from such products.

Keywords: long-distance walks; bush recreation, enhancement of regional economy, camping holiday, multi-day hiking

Introduction

Tourism has been estimated to account for approximately 10% of worldwide gross domestic product (Balmford, et al., 2009) and, internationally, nature-based tourism has been one of the fastest growing segments of the industry in recent decades (Goodwin, 1996; Davenport, et al., 2002; Balmford, et al., 2009). The same trend has been observed in Australia, where nature-based tourism is also a growing segment of the tourism market (Newsome, Phillips, Milewskii & Annear, 2002; Pickering & Hill, 2007; Balmford, Beresford, Green, Naidoo, Walpole & Manica, 2009). However, the attraction of nature for recreation is not a recent phenomenon.

The practice of walking for health, pleasure and recreation was already a well-established pastime of Europeans before their arrival in colonial Australia. Within Australia, the emergence of ‘bush tourism’ was particularly encouraged by the works of artists and writers who extolled the virtues of the Australian bush. As a consequence, walking for pleasure became a popular pastime.
Early ‘bushwalking’ attractions were the landscape and bushland around Katoomba, west of Sydney in the Blue Mountains (Harper, 2007). This area has remained one of Australia’s premier tourist destinations (Hardiman & Burgin, 2013). Another early outcome of the popularity of bush recreation was the gazettal of the first national park (Royal National Park) in Australia, and the second in the world, in 1879 (Burgin, 2015). However, destination nature-based tourism is not simply an historic pastime. It has witnessed substantial growth in recent years, particularly in Regional areas such as South-West Tasmania (Byers, 1996) and the Mount Kosciuszko Alpine Area (Pickering & Buckley, 2003; Pickering, Johnston, Green & Enders, 2003).

Many nature-based tourists do not, however, choose to merely passively view scenic landscapes but wish to actively immerse themselves within them, for example by undertaking long-distance walks. Indeed, ‘real’ bushwalks are often conceived as being long-distance walks of multiple days, with the walkers being self-sufficient and camping on-route. This type of multi-day walking is growing in popularity (Harper, 2007) and such walking holidays (cf. hiking; trekking) are a fast growing sector of the tourism industry. As a consequence, internationally, many tourism agencies and local governments have responded to such demand by developing, branding and promoting ‘walking products’ (e.g., the Pennine Way [United Kingdom] - TPWA, 2015; the Appalachian Trail [USA] - National Park Service, undated; the Inca Trail [Peru] - Andean Travel Web (2000-2010); the Tongariro Northern Circuit and Milford Track [New Zealand] - Department of Conservation [a] and [b], undated). In Australia, enthusiasts have a range of choices including the Overland Track and South Coast Track (Tasmania; The Sunstand Pty Ltd, undated); the Larapinta Trail (Epicurious Travel, undated); the Jatbula Trail (Parks and Wildlife Commission NT, 2015), and the Thorsborne Trail (Queensland Government, 2015)\(^1\). Independent studies suggest that: (i) a walk of 5 nights/6 days duration has greatest appeal; (ii) the setting should be diverse and spectacular and must be moderately difficult yet challenging (Parks and Wildlife Service, 2007). The strong and growing popularity of such long-distance walking tracks is illustrated by two Australasian examples: (i) the Overland Track, Tasmania, where walker numbers increased from 1,407 in 1971-1972 to 7,902 in 2013-2014 (Parks and Wildlife Service, undated), and the Milford Track, New Zealand, where walker numbers increased from 6,749 in 1995-1996 to 14,700 in 2006 (Department of Conservation, 1998; 2006). Both tracks now

\(^1\) For summary information see Table 1.
charge user fees and have walker numbers ‘capped’ in peak season to manage visitor demand and environmental impacts.

<table>
<thead>
<tr>
<th>Trail</th>
<th>Length (km)</th>
<th>Location</th>
<th>Visitors per annum</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appalachian Trail</td>
<td>3,354</td>
<td>USA</td>
<td>~2-3 million (sections); ~200,000 entire length</td>
<td>Appalachian Trail Conservancy (undated)</td>
</tr>
<tr>
<td>Pennine Way</td>
<td>429</td>
<td>UK</td>
<td>~200,000 (sections); 1,500-1,700 entire length</td>
<td>Peak District National Park Authority (undated)</td>
</tr>
<tr>
<td>Inca Trail</td>
<td>43</td>
<td>Peru</td>
<td>Annual visitors unknown; daily walker limit 500</td>
<td>Andean Travel Web (2000-2010)</td>
</tr>
<tr>
<td>Tongariro Northern Circuit</td>
<td>43</td>
<td>New Zealand</td>
<td>5882 entire length in 2010/11; walker number limits &amp; booking required</td>
<td>Harbrow (undated)</td>
</tr>
<tr>
<td>Milford Track</td>
<td>54</td>
<td>New Zealand</td>
<td>~14,700 entire length in 2006; walker number limits &amp; booking required</td>
<td>Department of Conservation (2006)</td>
</tr>
<tr>
<td>Overland Track</td>
<td>65</td>
<td>Tasmania</td>
<td>7902 entire length in 2013-14; walker number limits and booking required</td>
<td>Parks and Wildlife Service (undated)</td>
</tr>
<tr>
<td>South Coast Track</td>
<td>85</td>
<td>Tasmania</td>
<td>~1300 entire length</td>
<td>DPIPWE (undated)</td>
</tr>
<tr>
<td>Larapinta Trail</td>
<td>223</td>
<td>Northern Territory</td>
<td>&gt;1000 (sections + entire length)</td>
<td>Mackay and Brown, 2004</td>
</tr>
<tr>
<td>Thorsborne Trail</td>
<td>32</td>
<td>Queensland</td>
<td>Annual visitors unknown; walker number limits &amp; booking required</td>
<td>DNPSR (2015)</td>
</tr>
</tbody>
</table>

All the long-distance walking tracks mentioned in Table 1, (i) rely upon stunning scenic beauty as a major element of their appeal; (ii) are located within national parks for all or most of their length and (iii) are ‘walkers-only’. However, other popular long-distance walking tracks may be partly or wholly accessible to other modes of recreational transport,
including horse riding, mountain biking and motorised vehicles and traverse a wide range of public and private land tenures. Australian examples of such multi-use and/or multi-tenure tracks include the Bicentennial National Trail (Anon., undated a; Bicentennial National Trail, 2015), the Great North Walk (Anon., undated b; NSW T&I, 2010a), the Hume and Hovell Walking Track (NSW T&I, 2010b), and Six Foot Track (Life’s An Adventure, 2009).

The Bicentennial National Trail was originally developed as a horse-riding trail and is now also open to walkers and cyclists. Stretching 5,330 km along Australia’s eastern seaboard, it has been reported to be the longest waymarked trail in the world (Anon., undated a; Bicentennial National Trail, 2015) and takes travelers through a huge variety of landscapes as it follows the foothills of the Great Dividing Range and the Eastern Escapement from Cooktown (Northern Queensland) to Healesville (Victoria). The Great North Walk (Anon., undated b; NSW T&I, 2010a) also passes through many different land tenures and landscapes, including the vineyards of the Hunter Valley, along its 250 km route between Sydney and Newcastle city centres. Another track, the Hume and Hovell Walking Track (NSW T&I, 2010b) follows the 1824 expedition route of its explorer namesakes and so adds cultural to natural heritage appeal to attract walkers to its 440 km of walking trail (some sections are also open to motor vehicles and cyclists) between Yass and Albury (NSW). Along its route it provides exposure to a wide range of historical features including Aboriginal, explorer, agricultural, and mining history (Daly & Daly, 2012).

A final example of the appeal of long-distance walking tracks is the Six-Foot Track (NSW T&I, 2010c). Located to the west of the Blue Mountains (NSW), this track follows the old bridle trail between Katoomba and Jenolan Caves. The track is 44 km in length with two overnight stops, with the full walk typically taking 2.5-3 days. Despite not being located within a national park, with no outstanding scenic beauty, and walkers forced to share the track with 4WD vehicles and/or mountain bikes for approximately 40% of its length (pers. obs.), the track is extremely popular, with its own Website and Forum (Sixfoottrack.com, undated). The track is waymarked and the majority of walkers are self-guided, although commercial guiding and porterage are available (e.g., Life’s An Adventure, 2009). Annually, it receives thousands of visitors, and on weekends and public holidays the track is especially busy with vehicular traffic. Many of the walkers are relatively inexperienced, often tackling their first multi-day walk (pers. obs.). The track is also used for an annual charity fundraising marathon race, which had in excess of 1,200 entrants in 2015 (Sixfoot Track Marathon, 2015).
In this paper we have thus far shown evidence of trends in consumer behaviour indicating strong and growing demand for long-distance walking tracks, both internationally and in Australia specifically. We suggest that the development of such tracks, if well located and marketed, would act as powerful drawcards to attract tourist dollars to Regional Australia where such products do not currently exist. For example, income could be generated via increasing demand for fuel, accommodation and hospitality, food and supplies for such walks and, in addition, as souvenirs, tour guides, and porterage.

We will now provide a proposal for a new long-distance walking track as an example of what could potentially be achieved, and lastly comment on the potential economic benefits of such walking tracks in Regional Australia.

**Proposed Track**

*Site Description*

The proposed track is located within the Greater Blue Mountains, a segment of the Great Dividing Range where it abuts the eastern edge of the Greater Sydney urban conurbation. The Blue Mountains have been a nature tourism destination since the 1860s when the trans-mountain railway was completed. In particular, the upper Blue Mountains, centred on Katoomba, have historically been especially popular with Sydneysiders because of the majestic views of the area and cool summer climate.

Over time, the Region has become recognised as one of the most highly environmentally valued and comprehensively protected areas in Australia. Since original protection of 63,000 hectares as a National Park in 1959, the protected area has expanded. In 2000 the Park, along with other, contiguous protected areas, encompassing approximately 1.03 million hectares, was declared a World Heritage Area (WHA) – the Greater Blue Mountains World Heritage Area ([GBMWHA]; UNESCO 1992-2015). The GBMWHA incorporates seven national parks (Blue Mountains, Wollemi, Yengo, Nattai, Kanangra-Boyd, Gardens of Stone, Thirlmere Lakes), and the Jenolan Karst Conservation Reserve, together with at least segments of 12 local government areas (DECC 2009). Although many waymarked walking trails exist within the GBMWHA, they are usually short, taking only around 1-3 hours to complete and typically located along the cliff edges in the upper mountains, especially around the tourist ‘hotspots’ of Katoomba and Blackheath. Elsewhere in the GBMWHA, despite its large geographical size, dramatic scenic beauty and high floral and faunal biodiversity, no multi-day branded and waymarked trails exist, wherein self-
reliant tourists with limited navigation skills might enjoy a true Australian wilderness experience.

The proposed track, ‘The Wollemi Trail’, would be an 85 km, five day walking track (some sections walkable separately) located substantially within the Wollemi National Park Wilderness within the GBMWHA. This wilderness Park comprises some 488,620 ha of rugged, dissected sandstone plateau on the north-west edge of the Sydney Basin (Figure 1). It is the largest National Park within the GBMWHA and the second largest in New South Wales (NPWS, 2001). The Park is important for its spectacular scenery (Figure 2; 3), awe-inspiring geological and geomorphological features and rich ecological diversity, including many native threatened and endemic plant (e.g., Wollemi Pine \([Wollemia nobilis]\)) and animal species (e.g., broad-headed snake \([Hoplocephalus bungaroides]\); at least 120 Aboriginal cultural sites; and several European heritage artefacts of Regional and National significance (e.g., shale oil mining/refining and railway relics [Newnes; Glen Davis; Glow Worm Tunnel]; Burke, 1991; NPWS, 2001).

The area’s large size, low nutrient soils, dry climate and rugged terrain have historically combined to limit human exploitation for agriculture and facilitated protection of local biodiversity and maintenance of natural ecological processes with limited human interference. With the exception of a relatively small portion of its south-east, the Park has an absence of public vehicular access. This natural protection was enhanced by the declaration in 1997 and 1999 of 387,000 hectares as the Wollemi Wilderness Area under the Wilderness Act 1987 (NPWS, 2001; NSW Government, 1987). Wilderness is identified as ‘an area of land … that is … together with its plant and animal communities, in a state that has not been substantially modified by humans and their works or is capable of being restored to such a state; ... is of a sufficient size to make its maintenance in such a state feasible, and ... is capable of providing opportunities for solitude and appropriate self-reliant recreation' (NSW Government, 1987, p. 4). In the Wollemi Wilderness Area, identified ‘appropriate’ recreational activities include bushwalking, orienteering/regaining, camping, caving, fishing, li-loing, canyoning, canoeing, abseiling, and climbing (NPWS, 2001). Some of these require consent, either for safety reasons, protection of significant sites or to ensure that wilderness qualities are unimpaired for other users (e.g., group activities that may reduce opportunities for solitude). Horse riding, 4WD driving and cycling are all prohibited, essentially meaning public access is only by foot, and camping must be ‘primitive’. Fixed structures and vehicular access are not permitted unless needed for essential wilderness management, water quality management purposes or to provide access to existing private property or Aboriginal cultural
sites where there is no other reasonable alternative access. Information and walking tracks may be signposted outside of wilderness areas but not within them (NPWS, 2001).

Details of the Trail

Focusing on minimum impact to the landscape, a multi-day route has been identified (Figure 4) that encompasses the vistas, wilderness solitude, and historical relics of the area while using, wherever possible, existing (or abandoned) walking tracks and/or roads and open space to provide walkers a unique experience with a minimum of ecological disturbance. This is particularly important in this instance because the proposed track is located substantially within the wilderness of The Wollemi National Park. This area was chosen because it offers an outstanding opportunity for domestic and international visitors to experience Australian natural and cultural heritage in a wilderness setting.

Because of its proposed location, development of ‘The Wollemi Trail’ would require a careful realisation of opportunity while being fully compliant with wilderness legislation and values. Of particular concern would be minimising the need for sections of new trail creation, and the placement of basic campsites that would need to include water supply and toileting facilities. This proposal therefore envisages (a) use of existing tracks and campsites within or adjacent to the Park; (b) creation of two new camp sites outside of, but adjacent to, the Park and (c) creation of one new track section within the Park.

This proposal envisages the linking-up of existing tracks and the way marking of one new 15 kilometres section of track (Section 5; Figure 4) to create an 85 km end-to-end track (The Wollemi Trail), accessible only to walkers for substantially its entire length. It would run from the Glow Worm Tunnel near Lithgow to Ganguddy (Dunns Swamp) at Kandos Weir near Rylstone. The full length of the Trail would typically take at least five days and could be commenced and completed at either end.

Development of the Trail would leverage the Region’s natural and cultural heritage, and offer adventurous domestic and international tourists that are ‘reasonably’ fit and self-reliant (or willing to be professionally guided) with a unique experience. This is because the Trail would offer the opportunity for walker/s to traverse Australian wilderness, undisturbed by motorised vehicles, horse riders or mountain bikers and away from human habitation, while being surrounded by world-class scenic beauty within the heart of a World Heritage Area. Visitors attracted by the walk would directly and indirectly generate economic benefits for a surrounding Region struggling to develop a new tourism-based economy following the historical downturn in mining and agriculture industries in the area.
Although the Trail could be walked from either end, we have arbitrarily chosen to present the Trail here from the south end, moving north in eight identified sections, each section bounded by potential overnight camping sites (Figure 4).

Section 1: the first section of the Trail is approximately 10 km long. It would commence at an existing public car park 1 km south of the Glow Worm Tunnel on the Newnes Plateau. It would then lead into the Wolgan Valley by the walker’s choice of either the Pagoda Track or the Glow Worm Tunnel.

The Tunnel was originally built and operated as part of the railway line serving the Newnes and Glen Davis Kerosene Shale Works between 1906 and 1937. Today, it is a popular tourist destination owing to the bioluminescent display created by the larvae of the native fungus gnat *Arachnocampa richardsae* (Cartoscope, undated). Beyond the tunnel the Trail would follow an existing, disused railway route open to walkers and mountain bikers to an existing campsite at Newnes (Figure 4). This camp site has vehicle-access, drinkable creek water, self-composting toilets, and cabins.

Sections 2 and 3: the Trail would follow an existing track through the historic Newnes Kerosene Shale Works ruins and downstream alongside the Wolgan River for two kilometres before turning north and rising steeply uphill and over the plateau via the existing ‘Pipeline Track’ to a choice of two existing vehicle-accessible camp sites at Glen Davis (Figure 4). One, at the village centre, has modern camping facilities (e.g., showers; flush toilets); accommodation is also available in cottages or a boutique hotel. Alternatively, walkers could continue a further 4 km along the next section of the Trail on an unsealed road to Coorongooba camp site which has more basic camping facilities (e.g., self-composting toilets; creek water).
Figure 1: The Wollemi Trail and Wollemi National Park: Regional context

Key

- Existing walking track
- Proposed new walking track section
- Existing camp site
- Proposed new camp site

Source: adapted from Google Maps
Figure 2: Newnes historic site, Wolgan Valley, NSW (Photo: NSW Office of Environment and Heritage. www.nationalparks.nsw.gov.au)
Figure 3: Capertee Valley landscape, NSW (Photo: R. Nicolai. www.nationalparks.nsw.gov.au)
Figure 4: The Wollemi Trail: proposed route and topography

Key
- Public road (unsealed)
- 4WD track (public walking access)
- Existing walking track
- Proposed new walking track
- Existing camp site
- Proposed camp site
- Proposed section of Wollemi Trail

Source: adapted from Google Maps
Sections 4 and 5: from Coorongooba camp site the Trail would follow an existing walking track for five kilometres downstream alongside the Capertee River. A new section of track would need to be waymarked (e.g., biodegradable tape on trees) that would lead across the river and ascend very steeply (460 m height in 2 km) up a narrow spur with breathtaking views (pers. obs.) to the top of the escarpment on the north side of the valley. Here, the Trail would connect with the southern end of the disused ‘Army Road’. This 4WD road was built in the 1960s by the Australian Defence Force for training purposes. Despite being closed for many years and now overgrown, its route can still be faintly discerned on the ground (pers. obs.). The new section of waymarked Trail would follow the route of the old road north for approximately 13 km to Gospers Mountain. This is a private cattle grazing property of 189 acres surrounded by the Wollemi National Park. The owner has an agreement with National Parks and Wildlife Service for private 4WD access to the property. Public vehicular access is otherwise prohibited, and enforced by locks on a gate at Mount Boonbourwa and Red Hill (Coricudgy Road; Figure 4). The owner is currently seeking to sell the property (Kirk, pers. comm.) and thus an opportunity exists for an organisation (e.g., private tourism operator; local council; NPWS) to purchase all or part the property and establish basic camping facilities for walkers and (potentially) a much more sophisticated hotel complex.

Section 6: from Gospers Mountain, the Trail would follow the abovementioned 4WD road north for approximately 23 kilometres, crossing into the Coricudgy State Forest near Mount Boonbourwa (Figure 4). A new, basic camp site would be required at or near this point in the State Forest since there are no alternative facilities available and any new facilities would need to be outside of the wilderness area. Water should be available from the several nearby creeks; otherwise water tanks would be required and self-composting toilets would need to be built to develop a basic camp site.

Sections 7 and 8: from Mount Boonbourwa, walkers would follow the Trail westward along the existing 4WD road, through State Forest for approximately 10 km and either finish at the locked gate at Red Hill on the Coricudgy Road or walk a further 8 km to the existing Ganguddy (Dunns Swamp) campsite at Kandos Weir near Rylstone (vehicular access; creek water; self-composting toilets). This camp site is encased in The Wollemi National Park.

**Alternative options to wilderness for walking tracks and potential economic benefits**

Although the Trail proposed here, and most other long-distance tracks, are located within and/or closely associated with national parks for at least most of their length, there is also the potential to develop multi-day walking products beyond the typical ‘wilderness walks’. These
could, for example, encompass historical (e.g., the Hume and Hovell Walk, see above and e.g., Daly & Daly, 2012); aboriginal heritage; engineering/mining artifacts (e.g., partly encompassed within the Wollemi Trail outlined above); railway or travelling stock routes; river, city, agricultural landscapes; coastal or desert walks. They might also incorporate multiple landscapes and cultural/historical relics or other activities. To be sustainable in the longer term, however, long-distance walking tracks need to be ecologically sustainable and ‘holistic integrated person-environment systems’ for them to maximise economic benefits and ensure that they have strong market appeal as ecotourism destinations in their own right, not merely linkages between destinations (Hugo, 1999).

Where the focus of the walk is primarily for economic benefit of the community (we assume in most, if not all situations), it is desirable to consider developing the walk to include, either directly or indirectly, access to local outlets (e.g., hotels, Bed and Breakfast or other accommodation; wine and/or fine food outlets or outlets selling local foods and other produce; museums or other historical displays and/or sites; art galleries). Secure parking at the track head; accommodation; sale/hire of walking needs (e.g., maps and/or self-guided tour information, Global Positioning System devices and/or Personal Locator Beacons, light weight foods, other walking equipment); souvenirs and memorabilia; ‘shuttle buses’ [including taxi service] to and from track heads; tour guides/porterage and maintenance workers are also likely to (directly and indirectly) provide income for the local community.

**Conclusion**

Multi-day walking tracks are increasingly popular in Australia and elsewhere, and it has been demonstrated that they have the potential to generate significant economic benefits for areas in which they are located.

While the Greater Blue Mountains World Heritage Area contains world-class scenery and natural heritage for visitors seeking immersion in a bush-walking eco-tourism experience, many other areas of Australia also have unique landscapes and/or historical features that would provide a basis for exciting multi-day bushwalks. Carefully-planned tracks based on existing infrastructure and/or unique cultural and/or heritage attributes could generally be achieved with modest funding and, potentially, government funding. For example, the Federal Government has contributed $500k for construction of a 13.2 km walking/cycling track (‘Greater Blue Mountains Trail’) between Katoomba and Blackheath (Albanese, 2013).
Carefully developed to maximise income to the local community, and properly advertised and maintained, such walking tracks can substantially enhance income to the Regional community and such potential is becoming increasingly widely recognised. For example, a recent report identified the value of direct and indirect tourism expenditure from the Overland Track in Tasmania for 2012-2013 at $16.36 million and supported 85 full-time equivalent jobs. In the same state, a feasibility study for the creation of the new Three Capes Track in the Abel Tasman National Park has estimated the track could attract up to 10,000 walkers during the peak season, generate an additional 50,000 bed nights per annum locally, generate $18.6 million per annum in visitor expenditure and create 35 direct new jobs in the Region (Parks and Wildlife Service, 2007). Elsewhere in Australia, Victoria’s Trails Strategy 2014-24 estimates the annual economic benefits of the Great Ocean Walk (opened in 2006) as $15 million and more than 100 full-time equivalent jobs (Victorian Government, 2014).

References


Developing Localised Food Economies for Regional Cities

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Developing Localised Food Economies for Regional Cities

Abstract: In thirty-five years, in 2050, the world population is predicted to be reach between 9 and 9.5 billion people, up from 7.24 billion people in 2014. In 1804, just 208 years earlier there were only 1 billion people on earth. Population growth in the past 200 hundred years has been exponential, impacting our ability to feed world populations from the earth’s resources.

Today nearly 805 million people globally go hungry on a daily basis, while 1.5 billion people struggle with obesity. Yet the global community wastes one third of global food production or four times the amount of food required to feed the malnourished population and significant food supplies are used to feed livestock. The current global food system is unbalanced and not delivering food security for all people, in all regions. By 2050 there will be significantly more competition for quality nutritious food and food in general.

The food system is complex with broad impacts: food production practices impact regional and urban ecologies, while food distribution, manufacturing and access affect regional communities economic, and social wellbeing.

The impacts of food system issues on Australian regional cities are not always clear or well understood. This paper explores linkages between ecosystem services, food system issues and city resilience. A desktop review was conducted to identify international emerging food trends and food hub models, including international approaches to food hub models and Australian food hub feasibility studies.

Regional food systems need to be resilient sustainable social-ecological systems as they are fundamental to the regional city economic, social and environmental wellbeing. Local food, experimentation and social learning are fundamental to developing resilient food systems for regional cities.

Keywords: Food system, sustainability, resilience, regional cities, food hub

Introduction

Due to increasing pressure from human activities on earth’s ecosystems, regional cities face increasing difficulties in sustaining regional food systems. Pressures include exponential population growth, increasing urbanization, environmental degradation, climate change, and centralized food distribution. In particular the pressures from conventional chemical based monoculture farming impacts regional terrestrial and aquatic ecosystem health.

Regional ecosystem health is imperative for the resilience of regional cities. In order to feed future populations, healthy terrestrial and aquatic ecosystems are required to provide provisional, regulating, cultural and supporting services (Sandhu & Wratten, 2013). This paper seeks to highlight the correlation between food systems, regional ecosystems and regional city resilience. In particular the paper identifies contemporary food system issues, emerging food movements, and food distribution models.
Finally the paper reviews food hub models, networks and functions in practice internationally to identify potential solutions to improving regional city food economies for Australian application. A review of Australian food based social enterprises established in metropolitan regions, and current food hub feasibility studies underway in regional cities are referenced.

**Methodology**

The paper includes an overview of desktop reviews across food economy themes of ecosystem services, regional ecology, food system studies, agricultural practices and food hubs. In particular the desktop review explores linkages, dependencies and correlations between the research fields of ecosystem functions, sustainable agriculture, urban ecology and food systems in order to define areas for further research. A desktop review of food hub practices with an emphasis on building local food economies is incorporated.

**Food Systems, Ecosystems And City Resilience**

In Australia, agriculture is the single largest source of employment nationally, contributing approximately 4% GDP annually (DFAT 2009). Agricultural production is based on provisioning ecosystem services, particularly food and fiber. Along with processing, distribution, retail and food tourism, agricultural production impacts the economic and social wellbeing of regional communities through the local food system.

Natural and modified (farmland) ecosystems have an inherent ability to sustain life through provisioning services including freshwater supply, soil regeneration, nutrient cycling, crop pollination and food (Costanza et al. 1997; Daily 1997; MEA 2005). However there is a worldwide trend in declining ecosystem services with 60 per cent of ecosystem services degraded over the last 50 years, of those examined (MEA, 2005). Over the past century, conventional chemical-based broad scale farming has resulted in the degradation of valuable and essential ecosystem services such as climate regulation, water regulation, biodiversity and soil erosion protection (Porter et al. 2009).

The ecosystem has a direct correlation to the social and economic system in regional cities, and in turn a direct correlation to city resilience. This system can be described as a social-ecological system (SES) linking people and nature in which people depend on nature, and people’s behaviour impact nature (Berkes et al. 2003; Cummings 2011; Cummings et al 2011).
Ecosystem provisioning services of food and fiber form the production component of a regional food system. The food system can be defined as all processes and activities related to the production, distribution and consumption of food that can feed a population and affects human nutrition and health (FAO 2010). The food system takes into account commonly used practices and current food wastage that occurs at each stage of the system due to current distribution and consumption patterns.

Developing an understanding of the regional food system assists with understanding interrelated social pressures such as food security, food access, health and wellbeing, as well as interrelated economic pressures such as farm viability, local small and medium enterprises, food related manufacturing industries and tourism. A food system assessment should also identify ecosystem pressures with social and economic pressures highlighting areas for experimentation and learning in relation to city sustainability and regional food systems.

Learning networks and social learning occur in social-ecological systems. On average systems with higher diversity are more likely to prove resilient to change, because they have more possible responses (Walker 1992; Yachi and Loreau 1999). Experimentation within social and ecological systems allows a process of deliberate, premeditated manipulation of system elements designed to improve understanding of the system, as well as to identify better solutions to a particular problem.

Experimentation in improving regional food systems in recent years has included a range of activities and initiatives internationally across ecology, social, economic and governance areas. There has been an increasing trend in sustainable farm practices, mosaic / poly-culture farming, localising food distribution, and developing food system networks. The food hub models implemented in North America actively support these trends, providing case studies for the application of food hubs in regional Australia.

Food System challenges

The challenges we face in our current food system are multifaceted and complex. Some of these challenges, such as food waste, food security, malnutrition and obesity affecting community health, are well understood however measuring the complexity of food system impacts on regional communities is less understood. Conventional farm practices, such as the use of chemicals, fungicides and pesticides impact ecosystem health and food nutrition, through chemical runoff, soil, water and habitat degeneration and chemical residue in foods. Food waste, a major issue globally, is an output that currently occurs at each stage of the
system due to a mismatch of services, networks or distribution. The food system is influenced by political, social, economic and environmental aspects (FAO 2010).

The food system is considered a complex adaptive system with non-linear relationships between cause and effect; the presence of feedback loops which can regulate or amplify trends; the potential for alternate system states that are maintained by different regimes; and the ability to process information and respond to it (Simon 1962; Allen and Starr 1982; Gell-Mann 1992; Norberg and Cumming 2008). For example, ecosystems in decline have a decreasing potential to regulate regional climates, impacting rainfall, soil and water quality, habitat, biodiversity, food production and urban heat. These changes have a flow on affect, increasing pressure on human health, economic opportunity and society.

Figure 1: Correlation between ecosystem services, agricultural and urban systems

To capture the diversity of ecosystems, the Millennium Ecosystem Assessment (MEA 2005) grouped them into four basic services to better understand the correlation of ecosystem services to agricultural services and urban systems. The services are based on the functional characteristics: regulating services; provisioning services; cultural services; and supporting services.

The correlation of ecosystems services, agricultural and urban systems is outlined in Figure 1. Indicating the flow of impacts and dependencies. The direct drivers of ecosystem change are natural, biological and land use change; while the indirect drivers are economic,
social and cultural. Both agricultural and urban systems depend on and impact regional ecosystems.

Modified ecosystems, such as farmland, are considered providers and consumers of different ecosystem services (Sandhu and Wratten 2013). Depending on the practices implemented this can have destructive or regenerative impacts on the regional ecosystem, urban ecology and city resilience.

**Emerging Food Movements**

*Regenerative Farm Practices*

There is a (re-) emerging global food movement led by farmers, ecologists, futurists and consumers to restore ecosystem health, provide regenerative farming practices and nutritious food. The UN report *Trade and Environment Review 2013: Wake up Before its too Late*, calls for a profound transformation from the existing industrial agricultural system towards a mosaic of sustainable, regenerative production systems that improve the productivity of small-scale farmers and ecosystem health. This transformation would act as a catalyst for the significant role agriculture can play in dealing with resource scarcities, in mitigating and adapting to climate change and increasing localized economies.

Agro-ecology, an ecological approach to agriculture concerned with the ecological impact of agricultural practices, views agricultural systems as ecosystems. Farming practices, such as organic, biodynamic, agroforestry and permaculture working to rebuild the ecosystem, are increasing in food production, harvesting and management of the land.

Agroforestry and mosaic farming methods incorporate a diversity of crops and livestock for poly-culture farming. Agroforestry, a blending of agriculture and forestry, creates a more complex habitat supporting greater biodiversity and is being used to adapt to the impacts of climate change, helping to stabilize erosion, improve water and soil quality and provide additional produce yields to usual harvest. There is an increasing number of small to medium farmers adopting ethical farming practices in Australia including humane farming practices and fair pay.

*Consumer Demand For Healthy Nutritious Food*

Internationally there is growing health concerns over chemical use in the production of food. Over the last ten years, the Environmental Working Group (EWG) has produced an annual ‘Shopper’s Guide to Pesticides in Produce’. The data analyzed comes from tests undertaken
by the United States Department of Agriculture (USDA) in which everyday fruit and vegetables are washed and peeled to mimic what a consumer would do, prior to testing. The 2015 review found that consumers ingested pesticides with everyday conventionally grown produce, with nearly two-thirds of produce samples tested containing pesticide residues.

The *Australian Organic Report 2014* shows consumption of certified organic food, grown from sustainable farm practices at a record high. The report reveals the nation’s organic industry is worth $1.72 billion, up by 35% since 2012 and growing by over 15% each year. Organic and biodynamic food demand is on the increase globally from not only fresh produce of fruit and vegetables but also meats, grains, oils and packaged food. The *World of Organic Agriculture 2015* report highlights countries with the highest export values in 2013, listing Australia in tenth place with a year-on-year increase over the past 16 years.

The Food-Sensitive Planning and Urban Design (FSPUD) guidelines (Donovan, Larsen, McWhinnie, 2011) commissioned by the National Heart Foundation of Australia, were developed to provide a catalyst for further discussion on planning strategies for incorporating food in urban areas. Urban agriculture is increasingly seen as a response to complex social problems, including food security, and unemployment within areas of socio economic disadvantage. Urban agriculture is the practice of cultivating, processing, and distributing food in or around a town or city and includes small livestock, aquaculture, aquaponics, hydroponics, agroforestry, beekeeping, and horticulture. This contributes to food security, health, biodiversity, and urban systems. In Australia the main area of urban agriculture has been in the introduction of edible landscapes through school gardens, community gardens, street verges and orchards, although there is community support for more, particularly on urban rooftops and in vacant city blocks.

**Innovative Farm Finance Models**

There are a number of financing models to assist localized farming and distribution systems to provide investment to small-scale projects that develop regional resilience, jobs and stronger local economies. In the United States, *Farm Aid* fosters connections between farmers and eaters by growing and strengthening local and regional markets and working to get family farm food in urban neighborhoods, grocery stores, restaurants, schools and other public institutions. The organization, initiated in 1985, works with local, regional and national organizations to promote fair farm policies.
Slow Money, a non-profit organisation initiated in the United States, provides a financial model to assist small local food enterprises with developing a business. Since 2010, $40,413,594 has been invested, funding 402 small food enterprises - local community members, creating jobs, promoting culture, ecological and economic diversity and building robust food systems. This approach supports a new generation of small and mid-size organic farmers, rebuilding local and regional food processing and distribution, and improving nutrition. In Australia, the Biodynamic Marketing Institute provides free finance for its farm members, from the social enterprise profits.

Farmer start-up programs have become instrumental globally in bringing younger farmers to the land particularly in peri-urban regions. Programs aim to encourage and support a new generation of entrepreneurial, ecological farmers. The United States Department of Agriculture (USDA) and the Organic Farming Research Foundation offer Farm Start grants with funds available to young farm operators, organic farming or farming research projects.

Farm Start Manchester, in the United Kingdom is an incubator farm for new growers to trial farming business ideas in a low-risk setting. Launched in March 2013 in partnership with a local certified organic farm, Farm Start Manchester offers a two year plus program to nurture young organic farmers. In Australia an informal program established by members of the Demeter Biodynamic organization offers young farmers opportunities on biodynamic farms as part of Biodynamic Future Farmers.

Local Food & Food Distribution

A food system describes the complexity, diversity and scale of food production, processing, distribution and access, and may have different characteristics where defined by ecosystem, region, country or continent. The food system is impacted by: the governance and economics of food production; long-term resource capacity and resilience; the degree of food waste; and impacts of farming practices on the ecosystem in both rural and urban environments.

One of the primary assumptions underlying the sustainable diet is that foods are produced, processed, and distributed as locally as possible. This approach supports a food system that preserves local farmland and fosters local economic viability, requires less energy for transportation, and offers consumers the freshest and ideally the healthiest foods. However over the last century the diversity of food produced locally has reduced significantly.

In 2011, Victorian Eco-Innovation Lab (VEIL) undertook a study to model food availability for a nutritious diet, within the state of Victoria. This followed an earlier report by
VEIL on environmental challenges and resource constraints on the Victorian food system with findings of water scarcity, water and soil quality, energy (including oil), nutrient scarcity, climate change and diminishing biodiversity (Larsen et al. 2008). By considering the needs for a nutritious diet, rather than the diet as consumed by the average Australian, the project identified a shortfall in Victorian supplies of fruit and vegetable production in particular. The study also identified the need to affect a change in land use from the dominance of monoculture cropping and grazing to include greater diversity of vegetable production for human consumption.

With the dominance of broadacre cropping and livestock grazing in Australia, the distance food travels has increased adding significantly to the cost of food supply while the wholesale price of fresh food has remained relatively stagnant. Today Australian fresh produce is transported to central wholesale markets or purchased directly by supermarkets prior to redistribution into urban, rural and regional areas, often travelling thousands of kilometres. At the central markets local food competes for price and appearance against internationally produced food, refrigerated and transported from around the world.

There is no global agreement to what is local, although a radius of between 100 miles (160km) and 50 miles (80km) is referenced internationally. Local can mean from within a community, city, local government area, a region, a state or small country, and requires definition specific to its context. A food shed is defined as a local food system or geographic region producing food for a particular population or city, and describes the food flow from where it is produced to where it is consumed, including the transport and distribution methods (Feaghan, 2007).

A study by the Leopold Center for Sustainable Agriculture at Iowa State University assessed the transport of 28 fruits and vegetables to Iowa markets via local, regional, and conventional food distribution systems. The study found transportation of food in the conventional system, a national network using semitrailer trucks to deliver food to large grocery stores, traveled an average of 1,518 m (2,400 km) as opposed to locally sourced food that traveled an average of just 44.6 m (72 km) to local markets (Pirog et al 2001). A Melbourne study in 2007 revealed that food items like oranges, sausages, tea, baked beans with overseas ingredients have seen more of the world than most people. The report estimated the total distance travelled by 29 of our most common food items is 70,803 km (Gaballa and Abraham 2007). The 100-Mile Diet: A Year of Local Eating, published in 2007, references a
100-mile radius of food production to consumption, as an area “large enough to reach beyond a big city and small enough to feel truly local”.

Food Distribution Models and Local Economies

Today food trade is a major component of all trade and is conducted by multinational companies trading and transporting food globally. Food is transported as fresh, dried and processed fruit, vegetables and nuts, live and processed meat, grain and pulses, and processed dairy and dried milk in addition to packaged food and beverages.

In Australia a large portion of the food distribution and transportation occurs via two major supermarket networks and their supermarket bulk distribution centres. Packaged and fresh produce is transported great distances to bring a consistent global food offer to all supermarket chains. Alongside the development of the large multinational supermarket food distribution, wholesale produce markets have disappeared from regional centres and merged into a series of central wholesale markets in major capital cities.

In Australia there are six ‘central’ wholesale markets operating across Australia, located in Brisbane, Sydney, Melbourne, Adelaide, Perth and Newcastle. While originally operated by local governments, central markets now operate under a range of structures include central market authorities overseen by local government, unlisted and listed public companies and private companies. The Wholesale Markets for Darwin, Hobart and Canberra are privately owned and in some cases have more than one wholesaler. The Central Market consists of many wholesale agents who buy and sell Australian and imported produce based on the best possible price. There is no guarantee of price or produce sold. The key determinants influencing prices are supply and demand; with factors such as size, quality appearance, and global import produce prices influencing the return to Australian producers. The central markets remove food chain value from regional food economies.

Local food distribution systems allow flexibility for smaller scale producers that find it difficult to cover overheads and make a profitable return selling through agents at central wholesale markets. Many small to medium scale farmers are seeking ways to value add to their produce either through regional processing or direct sales in order to make their business profitable. The development of farm-gate shops, mobile market applications and online platforms are assisting farmers with alternative distribution systems that shorten the supply chain and provide a greater return on their produce.
A number of local and regional food distribution chains have emerged in recent years including community supported agriculture (CSA), regional farmers markets, food hubs, consumer cooperatives with box scheme delivery, and farmer co-operatives to aggregate and distribute food. There are currently more than forty accredited Victorian Farmers' markets providing an opportunity for farmers to sell direct and take full credit for their efforts.

Most of the work in rebuilding local food economies focuses on increasing food production to the regional market and diversifying the consumer base. This can be stimulated through assistance in aggregation, processing and distribution in a variety of forms and combinations ranging from community based non-profit to entrepreneurial initiatives. Single initiatives tend to struggle to gain momentum or service local food demand. Multiple initiatives acting on varying levers across the food system engage consumers at differing points of the system, enabling stronger and faster local food awareness and take-up by consumer, retailers and restaurateurs.

Food Hubs – A Model For Rebuilding Food Economies

A key development in rebuilding local food economies is the food hub. Food hubs are regional food enterprises used to scale up local food offers, working with local business across the food system. A food hub begins from a local need and entrepreneurial creativity and builds with support from actors across the local to regional food system.

“A regional food hub is a business or organisation that actively manages the aggregation, distribution and marketing of source identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail and institutional demand”. (Barham et al. 2012:4)

Table 1: Defining Characteristics of a Regional Hub (Fisher et al. 2013)

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<tr>
<th>Defining Characteristics of a Regional Food Hub</th>
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<tr>
<td>Regional food hubs are defined less by a particular business or legal structure, and more by how their functions and outcomes affect producers and the wider communities they serve. Defining characteristics of a regional food hub include:</td>
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<tr>
<td>- <strong>Carries out or coordinates the aggregation, distribution, and marketing of primarily locally/regionally produced foods from multiple producers to multiple markets.</strong></td>
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<td>- <strong>Considers producers as valued business partners</strong> instead of interchangeable suppliers and is committed to buying from small to mid-sized local producers whenever possible.</td>
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<tr>
<td>- <strong>Works closely with producers</strong>, particularly small-scale operations, to ensure they can meet buyer requirements by either providing technical assistance or finding partners that can provide this technical assistance.</td>
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<tr>
<td>- <strong>Uses product differentiation strategies to ensure that producers get a good price for their products</strong>. Examples of product differentiation strategies include identity preservation (knowing who produced it and where it comes from), group branding, specialty product attributes (such as heirloom or unusual varieties), and sustainable production practices (such as certified organic, minimum pesticides, or &quot;naturally&quot; grown or raised).</td>
</tr>
<tr>
<td>- <strong>Aims to be financially viable while also having positive economic, social, and environmental impacts within their communities</strong>, as demonstrated by carrying out certain production, community, or environmental services and activities.</td>
</tr>
</tbody>
</table>
It provides capacity for farmer support and employs an organisational model that works best for local communities, farmers, businesses, and regions. Food hubs can be categorised by the functions they perform and by the organisational structure.

Organisational or legal structures include: *non-profit* structures that may develop out of community-based initiatives; *cooperatives* owned by producers and/or consumers; *local government* or *public* where a city owned public market of farmers market provides the function; and *for-profit* privately held by company structure. Food hubs can be defined by function or model including: farm to business / institution model; farm to consumer model; and a hybrid model (Fischer et al. 2013).

**Figure 2: Legal Status and Model of Food Hubs in the United States.**

Source: Based on data from Regional Food Hub Resource Guide 2012 (Fischer et al. 2013)

In a *‘Farm to Business Model or Institution Model’* the primary purpose of a food hub is to sell produce wholesale to market buyers such as food cooperatives, grocery stores, health and aged care institutions, food service/catering business and restaurants. Under this model food hubs provide food aggregation and new wholesale market outlets for local growers that would be difficult or impossible to access individually. For example Manchester Veg People in the UK run a cooperative with growers and buyers providing long term contracts and assurance of price to farmers, and Walsma and Lyons, Grand Rapids in the U.S., privately held fresh produce distribution companies both use the Farm to business model.

In a *‘Farm to Consumer Model’* the hub is responsible for marketing, aggregating, packaging and distributing regional products directly to consumers. This includes community supported agriculture enterprises, online buying clubs, food delivery business’s and mobile farmers markets. In Australia, Food Connect a Brisbane based social enterprise established in 2005, market their produce as local, seasonal, ecological food direct from your farmer to consumer,
within an average food source radius of 140kms. In the U.S. the Gorge Grown Mobile Farmers Market provides access to quality local produce in small rural communities across regions lacking good access to locally produced food. This particularly assists small farmers who face the challenges of distribution and reach as a small business.

Under the ‘Hybrid Model’ the food hub sells wholesale to market buyers and directly to consumers. The US based Intervale Food Hub, a 22 member farmer collaborative, sells its farmer products directly to consumers through Community Supported Agriculture (CSA) model with more than 300 members as well as selling wholesale to restaurants and caterers, local schools and a hospital.

The Regional Food Hub Resource Guide highlights ways in which food hubs foster jobs within the agriculture sector and along the supply chain. The resource guide mapped 168 regional food hubs across the United States with a majority of food hubs located in the North East and North Central regions. As part of the National Food Hub Collaboration’s baseline assessment of food hubs in 2011, twenty food hubs were identified for further interviews on business viability. These were selected for their diversity in location and legal structure. (Fischer et al. 2013)

Food Hubs work with local producers, offering producers an opportunity to capture higher value for their products. By offering producers’ larger sales volumes, more stable sources of income and higher returns, food hubs provide opportunities for producers to expand and diversify production, translating into longer farm viability and potentially increased profitability.

Many food hubs also provide training and professional development in agricultural careers, farm start-ups, healthy food awareness and the adoption of sustainable agricultural practices. The National Food Collaboration Survey 2011 reported 47 per cent of food hub managers were actively distributing products to nearby food deserts, increasing access to healthy foods. In addition food hubs often partner with food organisations working to increase food access. Almost all food hubs in the survey sell fresh produce 98% and the majority of food hubs sell a variety of other products, including eggs 76%, dairy 64%, meat 62%, poultry 62% and grains 52% along with other value added products.

Food hubs assist in making farming more profitable, through investing in local farming communities, increasing sales by farmers and increasing regional consumption of local products. For instance Local Food Hub reinvested more than $850,000 in the local farming
community by purchasing from local producers, and utilising local distribution and accounting services. Food hubs can also exert a positive influence on the creation and success of new business servicing local communities.

Food Hub Networks & Research

Food Hubs have operated in North America over the past thirty years, with exponential growth across the country in the last decade. More recently there have been a number of food hub networks established to further coordinate networks, provide research and documentation of the economic viability of the food hubs, collaborate and share learning’s.

The Michigan Food Hub Learning and Innovation Network (the Network) works closely with the National Food Hub Collaboration led by the Wallace Centre at Winrock International to coordinate state and national food hub activities such as educational, funding and research opportunities. (Pirog et al. 2014) Ongoing research into food hub functions, regions, and benefits at local, state and national levels provide critical support in what is seen as the reestablishment of regional economies and food systems.

The need for a Network was identified by the Michigan Department of Agriculture and Rural Development (MDARD) and established from a Value-Added/Regional Food Systems Competitive Grant program in 2012. The MDARD identified food hubs as an important business model that could respond to key challenges, increase market opportunities for farmers, increase local food commerce with larger-volume food buyers and build capacity for hubs to supply healthy food to local communities.

Australian Food Hubs

While there are few local distribution organisations in Australia using the title ‘Food Hub’ there are a number of organizations operating throughout Australia that demonstrate key activities. Most operate within Australian capital cities with a population over one million people however a number of cooperative - box scheme deliveries operate successfully in regional cities and towns.

The lack of ‘food hub’ style organisations operating within Australian regional and rural areas may be due to population numbers, density and demand. However there is a developing interest in localised distribution and farmer hubs from regional cities in Victoria and Queensland. As the Australian population increases, experimentation in models for more localised food markets and distribution will be required in order to develop the long-term resilience of Australian regional cities.
The following table highlights a number of food distribution organisations in Australia providing localised distribution models, local foods, fair price to farmers and a short distribution model.

### Table 2: Australian Food Distribution / Food Hub Trials.

<table>
<thead>
<tr>
<th>Australian Food Hubs Network</th>
<th>Customer Region</th>
<th>Produce Region</th>
<th>Functions</th>
<th>Model</th>
<th>Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online - Australia</td>
<td>4000+</td>
<td>Farm gate sales online - from individual farmers to consumers</td>
<td>Web market</td>
<td>2013/14</td>
<td></td>
</tr>
<tr>
<td>Melbourne Northern Suburbs</td>
<td>160 km (100 mile)</td>
<td>Local food box scheme (fresh and packaged produce) and farmers market (organic and nonorganic) includes state market</td>
<td>City Farm outlet</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>Surf Coast &amp; Geelong</td>
<td>Regional</td>
<td>Local food box scheme (fresh and packaged produce) Local and organic from state market</td>
<td>Coop</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>Online - Australia</td>
<td>National</td>
<td>Online farmer produce sales – single produce type</td>
<td>Private Business</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>Brisbane &amp; region</td>
<td>140kms average</td>
<td>Local food box scheme (fresh and packaged produce)</td>
<td>Non Profit</td>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>Gippsland</td>
<td>Regional</td>
<td>Local food box scheme (fresh and packaged produce)</td>
<td>Coop</td>
<td>2013</td>
<td></td>
</tr>
<tr>
<td>Geelong and region</td>
<td>100kms (up to 200kms)</td>
<td>Aggregation &amp; retail of local produce chemical free 2 days pw</td>
<td>Private Business</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>Online - Australia</td>
<td>National</td>
<td>Online platform for farmers to sell direct,</td>
<td>Non Profit</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>South Eastern Melbourne</td>
<td>100kms (up to 200kms)</td>
<td>Wholesale Box Scheme - caterers, restaurants &amp; community groups (Local fresh)</td>
<td>Pilot Project</td>
<td>2013</td>
<td></td>
</tr>
<tr>
<td>Lower Campaspe Region</td>
<td>Approx. 50kms</td>
<td>In development – currently operating occasional farmers market and forums</td>
<td>Pilot Project</td>
<td>2014</td>
<td></td>
</tr>
</tbody>
</table>

**Food Hub Feasibility Studies**

While there are a number of food based hubs in capital cities across Australia, it is only in recent years there have been a number of food hub feasibility studies conducted in regional cities. The food hub feasibility study is an emerging area in regional cities, led by universities, food system / sustainability consultants, with the need clearly identified by local government.

In 2013 the City of Shepparton conducted a regional food hub study with recommendations towards establishing a local community garden and food hub within the community. In 2015 food hub feasibility studies commenced in the City of Bendigo, Victoria and Sunshine Coast, Queensland, led by local government economic departments.

In 2014 and 2015 Deakin University and Innate Ecology, in partnership with Regional Development Victoria and the City of Greater Geelong, undertook a food hub feasibility study.
for the Greater Geelong and Barwon region encompassing five local government areas and a 100 km radius. The study incorporated food industries across the food system, an agricultural audit, and proposed a strategy for a regional food hub to support food distribution and access not only through the key regional city of Geelong but also throughout the regions smaller townships.

There is clearly a need for improving regional city local food systems and ecosystem health identified by local government, industry and academia. The challenge is in establishing a number of pilot programs supported by government, industry and community.

**Conclusions**

This paper identifies a range of complex systems, the regional ecosystem, food system, and urban ecology that are interdependent. Current food system challenges occur across social, environmental and economic areas of regional cities, related to agriculture, manufacturing, hospitality, tourism and regional community health. The strength of a regional food system impacts employment, food security, environmental and community health. There is a growing interest in assessing regional food systems in order to understand the capacity for food hubs to stimulate regional city food economies.

Regional food hub models with the primary functions of local food distribution and defined social outcomes to farmers and producers as a core value of the enterprise provide regional socio-economic advantages. Secondary food hub functions such as regional mobile markets, farm start-up program and farm finance, provide additional benefits in farm innovation, increased horticulture production and value; and access to local fresh food in rural and areas of socio-economic disadvantage. Overall the primary and secondary functions of a regional food hub contribute to the long-term sustainability of a regional food system and local economy through multiple industry sectors, job growth, skills development, and community and environment health.

The potential benefits in skills development and regional employment in sustainable agriculture and food industries could assist in strengthening regional cities economically. The establishment of a food hub to support the local food system will require support from industry, local government and community. Further support such as the facilitation, funding and networks provided in the USA by state and federal governments, would enable more opportunities for the development of food hubs in Australia and consequently local food businesses along the food chain.
The North America food hub model provides multiple sustainability benefits for regional communities and cities. While experimentation into the operational and governance model for Australian regional food hubs is underway it has become clear that establishing regional food hubs will require commitment and support from local community, industry and government.

The challenge is to meet the increasing food demands of a growing urbanized population, while increasing ecosystem services and the productivity of agricultural systems (UN 1992). It is therefore vital to understand, measure and incorporate ecosystems in to decision making and planning of agriculture, food systems and cities (Sandhu & Wratten 2013).

A healthy regional food system is a critical component of city resilience. Implementation of the food hub model in Australian regional cities is an opportunity to improve agricultural resilience to climate change, improved capacity to feed the regional population from local nutritious food, improved local economy, ecosystem health and city resilience. Further experimentation, network development and social learning in localizing regional food systems in Australia is needed along with research into the potential benefits across environmental, social and economic realms.

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Development of a Strategy for Sustainable Tourism -
Shire of Leonora, North Eastern Goldfields of Western Australia

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Development of a Strategy for Sustainable Tourism -
Shire of Leonora, North Eastern Goldfields of Western Australia

ABSTRACT: This paper aims to provide economic and tourism developers in regional centres an outline of the process undertaken in developing a working tourism strategy with the Shire of Leonora, and to illustrate the importance of stakeholder engagement and community participation in this process.

The contents of the paper will include a geographical, economic and social overview of the Shire of Leonora; identify the outcomes required by the Shire; apply models and tools in developing the strategy to ensure practicable outcomes; identify the carrying capacity of the Shire for the tourism sector; consider the processes established to ensure community participation in recognising current and potential tourist attractions in the Shire; identify future tourism potential through project development categorised into short, medium and long term projects; and the importance of risk analysis in project development.

The conclusions of the paper will assess the completion of the tourism strategy, post submission endorsement by Council, project commencement and funding, and where they are now.

Keywords: Tourism strategy, Sustainable tourism, Stakeholder engagement, Community participation, Carrying capacity

Introduction

Mining in the Goldfields of Western Australia has experienced unprecedented growth over the past few decades. Gold has been the predominant mineral of interest with other minerals such as nickel providing the greater Goldfields region an exceptional economic benefit. Many shires and towns in this resource rich area of Western Australia (Government of Western Australia, 2014) have survived on a mono-economy that ultimately matures in parallel with the mining lifecycle. However, the mining lifecycle is dependent on a number of variables that make the market both volatile and capricious. The Shire of Leonora (Shire), a remote outback town in the North Eastern Goldfields of Western Australia, is one such place. Recognising that its longer term sustainability required economic diversification, the Shire undertook the development of a tourism strategy (strategy) as part of a 10 year Strategic Community Plan which would have the potential to provide commercial multiplicity and increased social value. The development of the strategy was contingent upon stakeholder engagement and community participation, and would consider the current tourism scenario within the Shire, identify potential tourism projects, and analyse the risks in project development.
Overview of the Shire of Leonora

Geographic

The Shire of Leonora (‘Shire’) is located approximately 830 kilometres north-east of Perth, Western Australia, and approximately 230 kilometres north of Kalgoorlie. The Shire encompasses an area of 31,893.2 km$^2$, and includes the towns of Leonora, Leinster, Agnew and the historic settlement of Gwalia (within the Leonora town-site). Abandoned townsites include Eulamina, Kathleen, Kurrajong, Lawlers, Linden, Malcolm, Mertondale, Murrin Murrin, Sir Samuel, Vivien, Woodarra, and Yundamindera also known as the ‘Granites’.

Map 1: Location of Shire of Leonora, Western Australia

The Shire can be accessed from the north through Meekatharra and Wiluna, east through Laverton, west through Sandstone, and south through Menzies and Kalgoorlie-Boulder.

Map 2: Accessibility to the Shire of Leonora
Economic

Leonora has a long history of mineral benefit dating back to the discovery of gold in 1896. As the main town in the Northern Goldfields in the early 1900’s, Leonora would herald an abundance of hotels, stores and associated services for their growing population of miners and prospectors. Since the heyday of the discovery of gold, Leonora has sustained itself on the benefit of mineral resources. More recently, as the price of gold and nickel has fluctuated, so too has the economic benefit the Shire has received. Over the period 2011 to 2014 the price of gold fell from AUD$1,650 to AUD1,470 per ounce, representing a decrease of 12.3%. For the period 2011 to 2013, the price of nickel fell from AUD$17,000 to AUD$15,200 per tonne, then in 2014 recovered to AUD$19,000 per tonne (Government of Western Australia, 2014).

The economic benefit from the mineral industry to the Shire, which includes the benefit from gold and nickel, has similarly decreased, a reduction of 41.4% between 2011 and 2014, from AUD$2.103billion to AUD$1.487billion (Government of Western Australia, 2014).

Table 1: Gold & Nickel Price Trends 2011-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Gold Price $/Oz</th>
<th>Nickel Price $/Tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>$1,700</td>
<td>$20,000</td>
</tr>
<tr>
<td>2012</td>
<td>$1,550</td>
<td>$18,500</td>
</tr>
<tr>
<td>2013</td>
<td>$1,350</td>
<td>$17,000</td>
</tr>
<tr>
<td>2014</td>
<td>$1,450</td>
<td>$15,500</td>
</tr>
</tbody>
</table>

Table 2: Value of Minerals to the Shire of Leonora, 2011-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Value in AUD (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>$2,103,155,688</td>
</tr>
<tr>
<td>2012</td>
<td>$1,716,904,174</td>
</tr>
<tr>
<td>2013</td>
<td>$1,594,666,656</td>
</tr>
<tr>
<td>2014</td>
<td>$1,487,214,934</td>
</tr>
</tbody>
</table>
With 49.5% of the working population of the Shire employed in mining, followed by a further 7.2% in construction, the next highest industry of employment is accommodation and food services, employing 6.4% of the working population (ABS, 2011).

The economic benefit of tourism to the Shire presents a contrast from the benefit received from mining. Tourist arrivals are recognised as international or domestic overnight visitors with the latest statistics available for 2013. International visitors totalled 2,000, spending 23,000 visitor nights in the Shire. The average length of stay was 11.3 nights, with an average spend of AUD$323 per trip, or AUD$29 per night. The total economic benefit to the Shire from international visitors was AUD$657,800 in 2013. Domestic overnight visitors totalled 26,900, spending 84,100 visitor nights in the Shire. The average length of stay was 3.1 nights, with an average spend of AUD$244 per trip, or AUD$80 per night. The total economic benefit to the Shire from domestic overnight visitors was AUD6,551,390 in 2013. The total visitor nights to the Shire was 107,100 and the average spend per night AUD67.30 (Australian Government, 2013) with a total benefit of AUD7,207,830. It is recognised that the average length of stay and spend per trip of international visitors was considerably higher than domestic overnight visitors, the average spend per night was lower.

Social

The Australian Bureau of Statistics (2011) data for the Shire at 30 June 2011 state the resident population of the Shire at 2,628, the median age was 31.9 years, with 80.6% of the resident population within the working population age (15 – 64). The total resident population employed was 1,317 comprising 45.2% of residents born overseas, and 9.2% of Aboriginal and Torres Strait Islander descent.

Development of the Strategy

The transition in mining from exploration and construction to operations is expected to decrease the workforce in the Goldfields-Esperance region from 2016 (Chamber of Minerals and Energy, 2014). With resource operations in the Shire of Leonora, including Agnew Gold Mining Company Pty Ltd, Barrick Gold, Darlot Mining Company Pty Ltd, St Barbara Limited and BHP Billiton (Nickel West), reducing their workforce by year end 2014 (Department of Mines and Petroleum, 2014), the outlook provided by the Chamber of Minerals and Energy (2014) is for this trend to continue with a project decline in royalties afforded to the Shire.
Initial consultation with the key stakeholders within the Shire – the Shire Chief Executive Officer, and Manager of Economic and Heritage Services - provided two distinct outcomes for the strategy:

1. diversification of the Shires’ tourism product,
2. identification of projects providing a potential economic and social benefit from an increase in tourists travelling through the Shire generating an increase in average length of stay and average spend per night.

Three key activities were proposed in the development of the strategy:

1. review of the current tourism scenario including key tourism stakeholders, accommodation and carrying capacity, transport, tourist activities, marketing and promotion, visitor statistics, and legislation, regulation and policy,
2. review of future tourism potential through project development and action plans which have the possibility of increasing business activity in the Shire,
3. analysis of the risk associated with tourism in the Shire.

Community Participation

Preserving the culture and history of a community, particularly those where mining has provided a primary source of benefit requires a triple bottom line approach (Laurence, 2001). The overall socioeconomic development of the community must be considered as the predominant factor when considering the feasibility and sustainability of tourism projects (Okazaki, 2008). This approach also encourages consideration of diversification and a process of community engagement and participation, or a bottom-up approach (Schianetz & Kavanagh, 2008).

In the development of the tourism strategy for the Shire, a community participation approach, ‘which has long been advocated as an integral part of sustainable tourism development’ (Okazaki, 2008), was applied. Okazaki’s community-based tourism model (Okazaki, 2008), incorporating theories of community participation, power redistribution, collaboration processes and social capital creation, was the primary model considered. This model integrates the benefits of these theories, allowing for the assessment of the level of community participation, and the provision of guidance for process of continual improvement.

The Shire considered community participation and collaboration critical in not only developing but implementing the completed strategy. Workshops were conducted in November 2013 and February 2014 with key stakeholders and community members,
engaging them by focusing on elements of the key activities in the development of the strategy. These included:

1. determining a broad and significant list of tourist attractions within the Shire,
2. conducting an analysis of the marketing of the Shire,
3. identifying projects for future tourism development,
4. assessing the risks for each of the identified projects.

Workshop participants collaborated in groups to share experiences, develop ideas, and provide a more comprehensive level of knowledge of the Shire than any one person could provide individually.

Prior to the workshops, only four key tourist attractions had been marketed through direct supporters of the Shire: the Terraces, Gwalia ghost town and museum, Malcolm Dam and the Loop Trails. The workshops provided the participants the opportunity to examine and discuss potential key attractions employing their local knowledge on the history, culture, geology and accessibility to each site. The outcome was an extensive list of 31 sites, each providing a significant point of difference and value to the tourism offering within the Shire. Participants then recognised each of these potential tourism sites into one or more tourism categories, including cultural tourism, heritage tourism, mine heritage tourism, eco-tourism, indigenous tourism, geo-tourism and event tourism. The gaps in the tourism categories were then identified presenting an opportunity for future tourism projects.

An analysis of both the current tourism scenario, and the marketing of tourism for the Shire was completed by the participants. A SWOT Analaysis, distinguishing internal strengths and weaknesses, and the external opportunities and threats, provided a concise analysis of the environment in which tourism is currently represented. This representation of the current scenario provided additional opportunity for future tourism projects and their future positioning while collaborating on problem solving.

Carrying Capacity

Originally derived from wildlife management where it was deemed that flora and fauna require certain physical conditions to survive, the concept of carrying capacity now encapsulates the ‘finite capacity for a tourist facility or destination and what that is should be established in order to restrict any detrimental impacts’ (Holloway & Humphries 2012, p. 500). Evolving from a wildlife management approach has been the introduction of the concept of carrying capacity when considering the limit of acceptable tourist or visitor
numbers to a community. Richardson and Fluker (2004) have identified five subtypes when considering the concept, including physical, economic, perceptual, social and ecological. While it may be difficult to establish one numerical capacity point amongst key stakeholders and the community, the five subtypes should be given consideration in the development of a tourism strategy to ensure any negative effect on the community is mitigated.

The strategy developed considered the physical carrying capacity of the Shire recognised through the identification of accommodation providers and the provision of on-site facilities. This included the number of rooms and guests per room, as well as complementary services such as restaurants and bars. The provision of transport to the Shire by air and road, the regularity of service schedules and accessibility to the Shire via various routes was also included.

As a regional town deriving its economic benefit primarily from the mining industry, the carrying capacity of the tourism market is constrained by the availability of rooms by accommodation providers, seats on flights to and from Leonora, and road accessibility during climate changes such as floods. Cost sensitivity of accommodation and travel is further impacted by the demand from the mining industry (Australian Government 2013a).

**Future Tourism Projects**

Following the identification and categorisation of the key attractions, participant groups selected one of the ‘gap’ tourism categories to discuss and develop potential tourism projects. The key criteria in the discussion and project development was to increase the length of stay of tourists in the Shire, thus increasing the economic benefit to the community, replicating the approach of Okazaki (2008). A timeframe for each of the tourism projects was then established. The suggested timeframes were short-term – up to 12 months in duration, medium-term – between 12 months and 2 years, and long-term – between 2 years and 5 years. Participants identified 30 projects, however, those which were deemed unfeasible, unsustainable or not reflecting a potential projected economic or social development opportunity to the community were not included in the final Tourism Strategy. Short-term projects numbered ten, and included projects such as the Leonora Townsite Historic Trail and Interpretive Signage, concise marketing and communication strategy, and the Gwalia ghost town and museum cottage conservation plan. Medium-term projects included themed trails, search engine optimisation plan, and an indigenous heritage plan. Long-term projects included Mazza’s office project and an Indigenous Gallery Project.
In addition to the projects proposed by the participants of the workshops, agencies providing direct and indirect support have also proposed tourism projects. The Goldfields Esperance Development Commission (GEDC), in conjunction with Regional Development Australia Goldfields-Esperance and the Goldfields Voluntary Regional Organisation of Councils, has developed a comprehensive document which identifies major projects in the region within a ten-year timeframe. The Goldfields Esperance Strategic Development Plan 2011-2021 (Goldfields Esperance Development Commission, 2012) has been developed in consultation with a diverse range of regional stakeholders. Developed in 2011 and reviewed in 2012, it is an organic document intended to be updated regularly. The Plan includes projects supporting the development of tourism with the region. The GEDC is currently seeking support from the Shires of the greater Goldfields, including the Shire of Leonora, to develop an Arts and Culture Trail spanning an area of approximately 2,400kms. In ‘Australia’s Golden Outback, Tourism Development Priorities 2010 – 2015’ (Tourism WA, 2010) priorities for the Shire include objectives to improve tourism signage to the area, and protect and develop the region’s historical assets.

Risk Analysis in Project Development
The development of tourism projects in a regional environment carries a far greater risk of disaster than those projects or developments in non-regional centres (Faulker, 2001). Consequently, the need to continually monitor and manage risks must be completed on a far more regular schedule. A compilation of potential risk exposures prior to the commencement of a project is essential so as to anticipate the frequency of occurrence (Mulligan, 2015). The communication of these risks is essential in recognising the risks to be managed and developing a risk management plan, which will assist in minimizing the impacts on the tourism industry. Assessment must also be made of the risk associated with potential damage from the increase in carrying capacity to surrounding shires and regions (Miller & Twining-Ward, 2005).

During workshops held in the Shire, participants were asked to identify the potential risks of the tourism industry to the Shire considering both internal and external elements, advise the risk appetite of the Shire and Community for the identified risks, and consider the likelihood of the risk occurring. Risk appetite was rated on a scale of 1 – 5 where 1 was considered ‘Insignificant’ and 5 was considered ‘Catastrophic’. Likelihood was rated on a scale of low, medium or high of the probability of occurrence. Analysis of the risks encompassed both internal and external threats and vulnerabilities to the destination, and
included the risk appetite - the level of risk that a corporation is willing to take in order to execute a strategy, and the likelihood of the occurrence.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk Appetite</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from major centres</td>
<td>5</td>
<td>H</td>
</tr>
<tr>
<td>Shire not recognising tourism as a priority</td>
<td>2</td>
<td>L</td>
</tr>
<tr>
<td>Lack of communication to residents and visitors</td>
<td>2.5</td>
<td>M</td>
</tr>
<tr>
<td>Price of fuel</td>
<td>3</td>
<td>H</td>
</tr>
<tr>
<td>Lack of appropriate skill sets for marketing</td>
<td>3</td>
<td>L</td>
</tr>
<tr>
<td>Lack of community/marketing/ability to attract tourist</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>Cost of public transport</td>
<td>4</td>
<td>H</td>
</tr>
<tr>
<td>Diminishing local population</td>
<td>4</td>
<td>H</td>
</tr>
<tr>
<td>Loss of service providers locally</td>
<td>4</td>
<td>H</td>
</tr>
<tr>
<td>Lack of willingness of facilities to co-operate</td>
<td>4</td>
<td>H</td>
</tr>
<tr>
<td>Fragmented community</td>
<td>5</td>
<td>H</td>
</tr>
<tr>
<td>Lack of community involvement</td>
<td>5</td>
<td>H</td>
</tr>
<tr>
<td>Lack of funding</td>
<td>5</td>
<td>H</td>
</tr>
<tr>
<td>Loss of key personnel</td>
<td>5</td>
<td>H</td>
</tr>
</tbody>
</table>

The risks identified are significant in determining the success of sustainable tourism in the Shire. However, a risk management plan and strategies for risk mitigation have been implemented to ensure the Shire develops into a sustainable tourism community.

**A Working Strategy**

The completion of the strategy was conducted in consultation with the Shire and community, presented to the Shire in February 2014 and endorsed by Council in August 2014. Project outcomes identified by the strategy were commenced in August 2014.

Ten short-term projects were identified including eight immediate start-up projects now completed, one in progress at 85% completion and one requiring a feasibility study. External funding has been sought for the commencement for three of the projects through local community grants funded by mining companies, and state government funding. The Shire continues to support and contribute to the development of tourism internally funding six of the short-term projects.
The medium-term projects have now commenced with the first project, geo-trails, in the scoping stage. Funding for the project will be sourced from both internal local government and external sources. Long-term projects will continue to be assessed and with the potential increase in visitor numbers to the region, may be identified as priority projects and progress to medium-term projects.

As projects are completed and open to visitors, an evaluation has been recommended to ensure that visitors and tourists are receiving the best possible experience. A four-step quality method, the Deming Cycle, allows the Shire to assess the environment to continually improve or enhance the visitor experience, implement the change incorporating internal and external factors, analyse results from the community and visitors, and further assess the changes required to further improve the results.

Areas of improvement can be assessed or identified through visitor and community surveys at the Visitor Information Centre, a link on the Shires’ website, or hyperlinks in the Shire’s online newsletter. Once the improvement has been completed, analysis of the results can be obtained by again surveying visitors and community. Further modification if required can then be completed. The implementation of the change can be managed through a Continual Improvement Dashboard Page and updated on an ongoing basis to ensure that the experience provided to visitors in the Shire is continually assessed and improved.

**Conclusion**

For regional communities experiencing a decrease in the economic benefit, it is essential that alternative industries are considered as economic supplements providing for sustainability of the town. The development of a tourism strategy through a community-based tourism approach ensures the community engages in the process of its development, locally held knowledge is shared, and ‘commonly perceived problems and widely accepted solutions are discovered via collaboration’ (Okazaki, 2008).

The achievement of a practical and pragmatic tourism strategy for the Shire of Leonora was dependent upon the outcomes for the strategy aligning with socioeconomic development of the community; a concise review of the current and future tourism potential of the town; and the participation, engagement and collaboration of the key stakeholders and the community. These were achieved and an organic working document developed. Support by the Shire in ensuring the identified project outcomes commenced were validated by the endorsement of the strategy by council.
Uncertainty in outbound travel due to various risks has the potential of increasing the number of domestic overnight tourists. It is essential that regional communities develop a tourism strategy through community participation, which can capture this potentially increasing market.
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Infrastructure as an instrument of national strategy: Lessons from China

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Abstract

Australia has one of the highest population growth rates in the developed world. Australia also has one of the world's most urbanized populations. Population growth has historically been seen as a strategy for national strengthening. However, infrastructure investment has failed to keep pace, leaving Australia with increasingly congested cities and neglected regional areas. China, on the other hand, has understood infrastructure as the foundation on which the national economy and regional development are built and sustained. Chinese investment in infrastructure has been massive and unrelenting. Many of the objections to infrastructure investment experienced in Australia may be found in China; yet China has not been stalled by them. Are there lessons to be learnt from the Chinese experience, and are these transferable to the Australian condition? This paper argues that Australian's reactive approach to infrastructure needs does circumvent the pitfalls experienced in China, but also fails to articulate a broader strategic vision for the 21st century.

Keywords

Infrastructure, Australia, China, economic growth, national competitiveness, national strategy.
The current state of infrastructure in Australia

In April of this year, 2015, The Australian Federal Government released its two volume, 230 page, 'Australian Infrastructure Audit.' The Audit pooled together the findings of over 350 commissioned studies, data sources, government departmental papers, and stakeholder submissions. It also sought a range of expert opinion on Australia's demographic projections and expected infrastructure requirements. Findings were presented by state and territory, and across the four primary sectors of transportation, telecommunications, energy, and water. Overall, Australia's infrastructure is challenged by rapid population growth. Australia's population is expected to increase by a quarter again, to 30.5 million, as early as 2031. (See Figure 1.) This makes Australia the world's fastest growing country with over 10 million people, already ranking fourth out of the 40 OECD countries in current population growth rates. Transportation is majorly congested, telecommunications lack competitive efficiency, while energy and water need reform that addresses quality, cost and supply issues (Infrastructure Australia, 2015). Though an increasing population should prove a stimulation to economic growth, a lack of commensurate infrastructure will impact on the nation's ability to capitalize on economic growth opportunities. The World Bank ranks Australia 16th in the world in trade and transportation infrastructure (The World Bank, 2014), while the World Economic Forum puts Australia's total infrastructure ranking at 20th out of 144 countries (World Economic Forum, 2015). Although these rankings are not low, infrastructure investment has not been keeping pace with expanding infrastructure needs, and the fear is that Australia's position will deteriorate should government fail to identify a suitable comprehensive infrastructure strategy.

Figure 1. Australian population growth projections to 2031.

The impetus to the 2015 infrastructure audit arose partially out of the findings of the 2010 'Report Card Project,' undertaken by Engineers Australia. The report concluded that while current infrastructure was largely 'adequate,' it would fail to remain so into the longer term. (A summary of the report's findings appear as Table 1.) The report went on to point out that Australia's projected infrastructure needs were long-term and far reaching, and beyond the shorter-term electoral or business cycles that currently informed infrastructure planning. In summary, the report called for a strategic vision for Australian infrastructure (Hardwicke, 2010). It is therefore instructive to reflect on the key executive findings of the 2015 audit:

"Australians expect their infrastructure networks to support a high quality, first world standard of living. They expect infrastructure to improve their quality of life in the future, notwithstanding significant population growth and major economic, social and environmental change." (Infrastructure Australia, 2015, p. 17)
The aspiration of this outcome, however, falls short of identifying a strategy by which it is to be achieved. Indeed, the challenges ahead have been plotted, but the way forward remains less certain. In Australia’s past, infrastructure advanced regional development. From federation through to the 1970’s, infrastructure projects, such as the Snowy Mountain Scheme, national road network, or suburban train lines, were expected to satisfy demand for generations. As strain began to reveal itself, the focus of the 1980’s became one of maximizing infrastructure utilization rates. This emphasis spurred the drive to privatization, which was seen as the natural road toward efficiency. However, private corporations are motivated by profit, and the imperatives driving decisions aimed to reduce operational costs, defer maintenance, and postpone capital investment. This has exacerbated an increasing short-fall between required and delivered services, as revealed in the Engineers Australia report of 2005 (Hardwicke, 2005). It was only at this relatively recent time that the relationship between infrastructure and national prosperity came to the fore in public debate. Is it that a prosperous nation deserves good infrastructure from its government, or, is it that government must invest in good infrastructure in order to develop national prosperity?

**Figure 2. Infrastructure risk and reward ratings.**
It may be a surprise to learn that Australia offers infrastructure project providers the highest rates of return, world-wide. It is third in terms of risk, just behind Singapore and New Zealand. (See Figure 2.) This it has done for consecutive years. The public-private-partnership market is mature, legal regimes are robust, and interest rates are low (BMI, 2014). Ironically, the high profitability of Australian infrastructure may be part of the problem. It is not simply that private companies may be tempted to run their assets into the ground in an effort to maximize returns, but that projects may not be taken up at all unless profitability to private enterprise is assured. Consider the Australia high speed rail project. (See Figure 3.) It was proposed in the early 1980's. In 2010 government undertook a $20m feasibility study, finding the project would cost $114,000m, running to 2065 to complete (Department of infrastructure & regional development, 2011). The project has no traction since no private company finds the project financially viable. Yet, with 12m people living within the Sydney - Melbourne corridor, and the obvious long-term advantages to regional development and decentralization that such a project would bring, the proposal remains stalled.

Figure 3. Proposed Australia high-speed rail network.

Policy acknowledgement that infrastructure is by nature an investment in benefits which largely transcend itself, and therefore problematic to justify financially, came when Kevin Rudd's Labor Party won the election of November 2007. Soon after, Labor introduced the 'Infrastructure Australia Act 2008,' recognizing the need for a national approach to infrastructure procurement. The Act created Infrastructure Australia as an independent statutory body to advise on infrastructure. It assesses the current state of Australia's infrastructure, forecasts Australia's infrastructure requirements, prioritizes needs, provides guidelines for procurers, and advises on financing (Hardwicke, 2010). Nevertheless, by its own admission:

"...it is clear that expenditure on maintaining existing infrastructure and providing new infrastructure is well below what is necessary. As well, there is still a lack of strategic and coordinated infrastructure planning and prioritization across many infrastructure sectors." (Infrastructure Report Card, 2010, p. 5)

China's appetite for infrastructure

The sometime stereotypical portrayal of China in 'western' thinking is of a large, over-populated nation with an oppressive leadership, that has transformed itself against the odds from centuries of poverty and backwardness into an emerging economic powerhouse. To the
Chinese, however, China has always been strong, with the last century of humiliation under western and colonial interference the singular aberration in millennia of continuous history as a great empire (Keay, 2008). The Romans of the 2nd century controlled 5 million km², containing one fifth of the world's population, through a network of garrisoned roads that made it possible to dispatch legions quickly to any corner of the empire. 18th century Britannia ruled the waves with flotillas of ships, trading across sea-lanes protected by a network of territories and treaty ports: Cape of Good Hope, Gibraltar, Suez, Bombay, Calcutta, the Bahamas, Singapore, and Hong Kong. 'Empire' carries negative connotations, but to those who sport the label, infrastructure is an indispensible tool of national cohesion.

Australia does not suffer from existential threats; it does not need to bind itself together with physical structures. This was not the case, however, during the Pacific War when the threat of a Japanese mainland invasion became real. Darwin suffered under twice as many bombs as were dropped on Pearl Harbour. The defence of the North seemed impossible in the event of invasion, and in February of 1942 a proposal emerged from the Menzies' government, known as the 'Brisbane Line,' in which defence of coastal regions south of Brisbane were to be prioritised; abandoning the whole north-west of the country (Dennis, Grey, Morris, Prior, & Bou, 2008). General MacArthur preferred an offensive strategy, intending to bring the fight to the Japanese. At the start of the war, the 2,800km Stuart Highway, north to Darwin, was unsealed track, largely impassable for heavy vehicles. By mid 1942 it was widened and sealed. By war's end convoys of trucks had covered 160m kilometres, moving over 200,000 troops to battle (ANZAC day commemoration committee, 2015). The legacy is Darwin's integration with Australia's south.

On July 1st, 2006, the 1.956km long Xining - Lhasa high speed rail service, opened. This is an unprecedented technological feat. Trains are pressurized and equipped with oxygen to deal with altitude sickness. The track is constructed at an average altitude of 4,500 meters, of which 550 km is laid on permafrost. It passes over 675 bridges and through dozens of kilometre long tunnels carved into frozen earth. At a cost of $US3,500m, ticket sales cannot recoup investment (Railway Technology, 2015). However, the stated purpose of this project is to expand Chinese economic prosperity to Tibet. A further 'benefit' is to open up Tibet to Han Chinese immigration and improve military access to the region. Six further, more demanding train routes into Tibet, are planned or underway. (See Figure 4.)

Figure 4. Tibetan transportation infrastructure.

Countries compete, and do so on the basis of factor endowments. National strength ultimately derives from economic strength. Infrastructure, properly employed, leverages national comparative advantages. The trick is to understand where a nation's economic
potential is greatest, and the nature of the infrastructure needed to unlock that potential. There is also the caveat of diminishing returns, where beyond a certain point further investment in infrastructure fails to deliver further benefits. Though the link between infrastructure investment and economic growth is accepted, it remains a loose science. Many researchers have attempted to unravel the relationship. Empirical research in infrastructure begins with Aschauer, who was the first to demonstrate that a slowdown in US productivity was linked to decreasing public infrastructure expenditure (Aschauer, 1989). Other studies followed, confirming infrastructure investment stimulates economic growth (Garcia-Mila, McGuire, & Porter, 1996; Uchimura & Gao, 1993). Others still compared the effects of public and private capital. Results vary, but overall public capital generates higher marginal product (Izaguirre & Rao, 2000). The nature, too, of the economic stimulus effected by infrastructure has also been considered. Manufacturing productivity strengthens (Macdonald, 2008); private investment goes up (Khan & Kumar, 1997); welfare increases (Rioja, 2001). Even labour productivity is shown to improve (Hall & Jones, 1999). It is claimed that public capital investment raises income per capita in general (Romp & De Haan, 2007). The strongest evidence, however, confirms that even where short-term benefits fail to materialise, over the longer-term infrastructure will deliver significant economic gains (Canning & Pedroni, 2004; Fedderke, Perkins, & Luiz, 2006).

Figure 5. Infrastructure expenditure as percentage of GDP (1992-2011).

Figure 6. China’s planned investment in infrastructure stock.
The evidence that infrastructure has contributed positively to China's economic rise is extensive and compelling (Sahoo, Dash, & Nataraj, 2012). Since China's 'opening up' under Deng Xiaoping, its economy has grown at an average of 7.5% over 30 years to 2000, and at a rate of 10% for a further decade. Current growth is back at 7%, with the construction industry at 6.5% in 2015, down from 6.8% in the previous year (BMI, 2015). This growth was driven by cheap government-backed debt fuelled investment in infrastructure. Despite the stock-market shock of July 2015, long-term fundamentals remain strong. The question is, when will China finally have assembled all the infrastructure it needs? Indeed, when will the money run out? More importantly, what will it mean for China and the Chinese economy when infrastructure saturation is reached? China has been spending more on infrastructure than anybody else, for years. (See Figure 5.) But it plans to spend even more again into the future. (See Figure 6.)

The emergence of a Chinese infrastructure strategy

Three strategies that provide a rational for heavy investment in infrastructure can be inferred. Firstly, infrastructure improves productivity. Infrastructure increases manufacturing sector competitiveness, stimulates direct investment, and develops human capital. This is known. But in China infrastructure is commissioned on the basis of achieving state planned economic growth. China procures infrastructure through an intricate web of planning agencies whose roles are to realize set targets tabled in five-year plans across industry sectors and geographical regions (Liu, 2004). (See Figure 7.) In this scenario, extensive long-term greenfield infrastructure may be procured in excess of actual current needs. The risks are capital asset redundancy, inefficient allocation and expenditure of cheap financing, and lack of return on investment. The benefits are improved housing, amenities and quality of life for workers, up-skilling of human capital with associated increased salaries, and social cohesion. There is also a flow-on effect, where buoyant core industries lifts up-stream and down-stream sectors such as technology and services. Prosperity arises from a combination of factors; access to health, education, utilities, technology, good and services. For the Chinese, infrastructure is seen as the initial catalyst to economic development.

Secondly, infrastructure extends growth to regional areas. Jurisdictions adjacent to those heavily invested in infrastructure benefit from a synergetic effect. China is composed of 22 provinces, 5 autonomous regions, 4 municipalities, and 2 special administrative regions. Each varies in size, population and economic strength, but are roughly comparable to a major European country. China, too, has five layers of government; the most in the world. (By comparison, Australia has three: local, state and federal.) These jurisdictions compete openly. While Australian cities have their rivalry, Chinese provincial level governments vie directly
against each other for investment and growth. Political careers are made or broken on the basis of economic performance. While western politicians are frequently lawyers, Chinese politicians are a mix of engineers or, ironically, economists. Central Party members typically come to power on the basis of outcomes achieved at provincial level. Cross-border developmental activities are carefully monitored and the positive lessons, effective incentives, and winning practices of governments with above benchmark performances are transplanted to those looking to catch up. Coastal provinces, Shanghai and Beijing, where growth is strongest, have the most advanced infrastructure. Neighbouring provinces benefit by trading their cheaper 'migrant' labour as they adjust business incentives to attract investment and replicate supporting infrastructure further inland. Figure 8 shows transportation infrastructure density; heavier along the coast and radial out of Beijing. Figure 9 shows provincial levels of projected GDP for the year 2020. The later emulates the pattern of the former. China's 'go west' development strategy is likely to attract further infrastructure investment well into the future. Other argue that growth in the east will continue to out-pace the west and demand the bulk of further investment (Shi & Huang, 2014).

Figure 8. China's transportation infrastructure.

Figure 9. China's projected GDP by province (for 2020).
(Source: HSBC, CEIC, IMF, CIA)
Thirdly, infrastructure improves Chinese power projection. Capabilities in infrastructure make it possible for China to not only offer construction services globally, but to extract trade benefits from global markets. At the turn of this century, China had no major presence in the global construction market. By 2013, there were 55 Chinese companies on ENR's list of 'top 250 international contractors' (Reina, 2013). In 2012, Chinese contractors earned US$67,070m from overseas infrastructure projects. By 2014, this had increased 117% to US$191,710m (H. Li, Chen, & Martek, 2015). This is expected to rise again. By the time of Mao's death in 1976, China was a technological backwater. China's strategy in 'opening-up' was to trade domestic market access for technology. Even with accession to the World Trade Organization, December 2001, China's licensing requirements make it difficult for foreign firms to operate without a Chinese partner. China has absorbed major world class engineering capabilities in power, telecommunications, oil and gas, petrochemicals, mining, ports, transportation, construction, and even military and space. China has a myriad of infrastructure enterprises, employing millions, that constantly need to be fed more projects. China graduates 500,000 engineers yearly. Onshore, firms like the 'China railway engineering group' alone employs 300,000. Offshore, projects generated by the newly formed controversial 'Asian infrastructure investment bank' will extend China's global influence.

Future trajectories of Chinese infrastructure

Investment in Chinese infrastructure has been debt financed. The situation is unsustainable in the long-term. This is due to increasing current account imbalances, while it is becoming more expensive to add a nominal unit of GDP to the economy. Nevertheless, China's infrastructure market is expected to grow from its value of $US199,390m in 2014 to $US259,610m in 2018; retaining a 1.8% value of total Chinese GDP (BMI, 2015). Simply, the Chinese infrastructure market is forecast to remain the world's largest for at least a decade. The preoccupation among policy-makers is in transitioning to a more sustainable financing model. Public-private-partnerships (PPPs) are the emerging preferred method of infrastructure procurement.

Figure 10. The 'Angola mode' of infrastructure financing.


Chinese have shown themselves capable of developing a range of financing mechanisms for procuring infrastructure, particularly overseas. The best known is the 'Angola mode.' A Chinese company seeks a resource from a foreign country, and agrees to pay royalties for extraction rights. However, infrastructure, such as mine, railway, roads and port are needed to effect extraction. Other Chinese companies contract to supply these for a price,
secured by the royalties to be paid. The transaction is mediated by the China EXIM Bank, with capital secured by central government. (See Figure 10.) In the end, China obtains needed resources, develops capabilities in infrastructure construction, ingratiates itself politically with the host nation, all at minimal cost.

**Figure 11. Expanding global activity of Chinese infrastructure providers.**
(Source: Li, Chen & Martek, (2015), 'Global activity distribution patterns of top international Chinese contractors')

China's reach into global infrastructure provision is growing. Just as with its domestic base, infrastructure augments specific economic objectives. Moreover, infrastructure projects are found to spill-over into neighbouring regions, both to sustain work volumes, and to integrate wider spheres of influence into its economic web. (See Figure 11.) It is instructive to note that China tends to operate in countries shunned by other international infrastructure majors. This is attributable to China not yet being able to compete directly in the mature infrastructure markets of Europe and the US, but it is also the case that first world firms avoid a range of countries for political reasons; reasons which do not apply to China. Such countries include Iran, Venezuela, Kazakhstan, Myanmar, Pakistan and the Sudan.

**Contrasting Australian and Chinese approaches to infrastructure**

China has managed some spectacular failures in infrastructure. The 'Three Gorges Dam' cost US$37,000m, submerged 13 cities, 140 towns, and 1,600 villages inhabited by 1.3m people who had to be relocated (K. Li, Zhu, Wu, & Huang, 2013). The dam's ability to prevent flooding, or even provide fresh water, has been questioned. Its impact on the environment is dramatic; even apparently affecting the Earth's rotation (Yang & Lu, 2013). The Wenzhou high-speed train crash of 23rd July, 2011, killed 40 people and injured 172 (Coonan, 2011). These outcomes are held as exemplars of the rash planning and corrupt execution that characterize the folly of massive infrastructure. But the Chinese don't see it that way. Mistakes made are not an argument to desist, but experiences from which to learn as China presses ahead with its agenda of progress. China has dozens more dam projects in the pipeline, and has began its US$62,000m 'South-to-North Water Project' (Freeman, 2011). High-speed rail lines are being planned and built to link every single major Chinese city, and to connect these south to Singapore, and west to Paris.

Australia is not without its own infrastructure failures. The Victorian desalination plant, on the Bass Coast, was completed in 2012 at a cost of $4,000m. At the time of commissioning, Victorian reservoirs were at 80% capacity, and the plant was put onto standby. Though no water is drawn, a minimum fee of $1.8m is paid to the operator every single day, effective for 27 years (Lauder, 2012). The Brisbane Clem Jones Tunnel,
Melbourne's Eastlink, Sydney's Cross City and Lane Cove tunnels, and the Freightlink railway, among others, all operate on losses. The lesson drawn is a reticence to procure infrastructure that is not absolutely necessary. The $17,000m East-West link contract, signed in September 2014, was cancelled in April 2015, with a termination payout of $339m (Lucas & Gordon, 2015). It is right that Australia assess and scrutinize the viability of projects carefully and responsibly. The challenge is that a case-by-case approach to infrastructure procurement will find us solving specific problems well enough, but leave us short of a comprehensive future vision.

Australian media has reported on China's so-called 'ghost cities,' in which whole city size developments, complete with multiple apartment towers, shopping-malls, hospitals and university complexes, are shown without inhabitants (Brown, 2011). What is not explained is that the central government is putting into effect comprehensive plans for wholly new regional hubs, including ten new city clusters across China catering for up to 100m people each. These hubs will be dedicated to specific key industries and linked by comprehensive infrastructure. The projects are expected to take 17 to 23 years to populate. Melbourne finds itself under unprecedented population pressure. China shares this experience, with Shanghai alone growing sevenfold to 23m people in the 15 years to 2014. China's crushing urbanization problems are the rationale for these initiatives. These new cities are gaining traction; Kangbashi has 300,000 people, Nanhui 800,000 and Zhengdong close to 5m (Shepard, 2015).

Chinese decision making is fast, visionary, efficient and authoritarian. It is criticised as opaque and non-participatory. The role of cultural differences in shaping societies is much discussed by sociologists. Western political philosophy leans toward protection of individual rights from state interferences. Western policy-making is thus characterised by checks and balances to ensure the accommodation of a plurality of individual preferences. Asians see this as a recipe for fragmentation and conflict. Chinese sensibilities, specifically, are informed by Confucianism, Buddhism, Taoism and Legalism, as well as by Marxism and Scientific Modernism (de Jong, 2012). The mix produces a complex value system, but it is fair to say that justice, social order, stability, harmony and deference to authority, are highly valued. This national psychology goes some way to explaining China's ability to reach for a state sponsored vision. Chinese stress collective rather than individual rationality. They identify as bound by duties rather than imbued with rights. And as long as government delivers prosperity, Chinese are prepared to concede a measure of autonomy.

Figure 12. China's Central Asian infrastructure projects.
(Source: Stratfor (2013), www.stratfor.com)
The Chinese government similarly recognizes that its legitimacy relies on its continued ability to deliver progress to its citizens. It sees itself in a battle to retain power and return China to its 'rightful' place as the 'Central Kingdom.' In terms of military security, China is creating a Pacific buffer zone across vast swathes of the South China Sea. In terms of economic security, China is enmeshing itself into extensive global trade networks. (See Figure 12.) These ambitions are all served by striking commitments to infrastructure. In the words of Sun Tze:

"The supreme art of war is to subdue the enemy without fighting." (Sun et al., 1998)

References


Towards an Australia-GCC FTA: Strategies and frameworks to facilitate long-term and mutually beneficial partnerships between GCC food importers and regional Australia’s agriculture exporters

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ABSTRACT: The States of the Gulf Cooperation Council (GCC), comprising Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, provide an important market for Australian agribusiness. In 2013, GCC trade with Australia was AU$12.307 billion, of which Australian exports of live animals and other agricultural and food products comprised around AU$2 billion (DFAT 2015). With rapidly growing populations but limited arable land and potable water, GCC countries are increasingly turning to trade and investment to underpin their national food security strategies. Having learned lessons from failed investments in agriculture in developing countries, often food insecure themselves, GCC countries are now looking for investment and export opportunities in low-risk, net food exporting countries such as Australia. As negotiations for an Australia-GCC Free Trade Agreement (FTA) are set to resume following a suspended period awaiting the GCC’s review of its trade agreement policy, it is timely to consider the opportunities for the development of regional agriculture in Australia that might arise from such an agreement. It is also opportune in the light of recently signed FTAs with three of Australia’s major trading partners, Japan, The Republic of Korea, and China.

This paper will first provide a short critical analysis of Australia’s existing FTAs as a mechanism to access premium agricultural markets. In order to frame more effectively the trade and investment opportunities with the GCC, the paper will then discuss the needs of GCC countries to secure long-term, sustainable food imports. In doing so, the authors will draw on their work recently concluded for a GCC sovereign wealth fund in developing a food security investment strategy. Discussion will include the methodology for devising what the authors have called a dual mandate investment strategy that delivers on both a food security and financial return mandate. As will be argued, GCC-based investors who have a specific food security perspective differ in approach to traditional capital investments or offtake agreements in their pursuit for long-term, engaged and mutually beneficial partnerships. The paper will conclude by identifying how regional businesses might best align with these opportunities, both in the short-term and in the future through targeted trade and GCC investment, which might in turn be enhanced, though not solely dependent upon, a future Australia-GCC FTA.

Keywords: Free Trade Agreements; Gulf Cooperation Council; food security; ‘Dual Mandate’ investment strategy; regional development

Introduction

Agriculture makes a significant contribution to Australia’s economy accounting for more than 20% of export earnings. Australian farmers export approximately 60% of what they produce (ABS 2015). In 2014 there were 115,000 businesses for which agriculture was the

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1 In 2013-14, the value of primary farm production was $51 billion, contributing around 2% of Australia’s GDP, and 15% of the country’s total merchandise exports. The manufacturing industry
primary activity and a further 13,900 businesses for which agriculture was the secondary activity (p. 8). In regional areas, in particular, agriculture is a significant employer. Some 270,000 people are ‘employed in the sector with a further 223,000 in food, beverage and tobacco manufacturing’ (Australian Government 2015, p. 8).

In assessing how to enhance productivity and growth in the agriculture sector, the Government’s 2015 Agriculture Competitiveness White Paper (Australian Government 2015) identified several priority areas, including increased access to premium export markets through Free Trade Agreements (FTAs). FTAs are seen as a means by which tariffs can be reduced or eliminated altogether while also addressing technical trade barriers (TTB). The FTAs that have entered into force with Japan and the Republic of Korea, and the FTA recently signed with China (yet to be entered into force) are spot-lighted as exemplars of what can be achieved to remove or reduce barriers to trade and to help Australian businesses to gain access to Asia’s ‘high-value premium markets’, which will ultimately include more than one billion people who are expected to move into the middle class by 2060 (p.118).

However, on closer examination these FTAs will preserve tariffs on some key agricultural goods as well as TTBs that affect products in some states but not others. It is therefore far from certain that these FTAs are indeed the ‘magic bullet’ that will result in higher exports to ‘premium’ Asian markets. Without jeopardising the potential benefits to Australia that FTAs might deliver, other export markets beyond Asia are worthy of consideration, especially in places where there is limited capacity to grow food due to water scarcity and a lack of arable land. In that context, Australian agricultural exporters would be in a strong bargaining position to negotiate a more favourable deal in relation to tariffs and TTBs.

It follows that the relatively unknown FTA negotiations with the states of the Gulf Cooperation Council (GCC), namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the

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2 A Free Trade Agreement, also referred to as an Economic Partnership Agreement, is an international treaty intended to remove barriers to trade, such as tariffs, in order to facilitate stronger trade and commercial and economic integration between participating countries. An FTA can be between two countries only (e.g. the Australia-United States FTA), between one country and a regional organisation (e.g. the ASEAN-Australia-New Zealand FTA), or between multiple participants within a particular region (e.g. the Trans-Pacific partnership agreement currently under negotiation).
United Arab Emirates, have the potential to capture and build significantly on an already important market for Australian agricultural exports such as livestock, meat, dairy products, vegetables, sugar, wheat and other grains (DFAT 2015). With rapidly growing populations but limited arable land and potable water, GCC countries are increasingly turning to external trade and the investment of their surplus earnings from exports of oil and gas to underpin their national food security strategies. Having learned lessons from failed investments in agriculture in developing countries, which are often food insecure themselves (Shepherd 2013; Woertz 2013), GCC countries are now looking for investment and export opportunities in low-risk, net food exporting countries such as Australia.

This paper will first provide a short critical analysis of Australia’s existing FTAs as a mechanism for accessing premium agricultural markets. In order to frame more effectively Australia’s trade and investment opportunities with the GCC, the paper will then discuss the needs of GCC countries to secure long-term, sustainable food imports. In doing so, the authors will draw on their work recently concluded for a GCC sovereign wealth fund in developing a food security investment strategy. Discussion will include the methodology for devising what the authors have called a “dual mandate” investment strategy that delivers on both food security and financial returns. As will be argued, GCC-based investors who have a specific food security perspective differ in approach to investors in traditional capital investments or offtake agreements. This in turn points the way to significant opportunities for Australian businesses in the agricultural sector to pursue long-term, engaged and mutually beneficial partnerships. The paper will conclude by identifying how regional businesses might best align with these opportunities, both in the short-term and in the future through targeted trade and GCC investment, which might in turn be enhanced, though not solely dependent upon, a future Australia-GCC FTA.

**FTAs not quite the ‘magic bullet’ for regional development**

To date Australia has nine FTAs currently in force with New Zealand, Singapore, Thailand, the United States, Chile, the Association of South East Asian Nations (ASEAN) (with New Zealand), Malaysia, and most recently with Korea and Japan. Together, these countries represent 42% of Australia’s total trade. China, which accounts for a further 23% of Australia’s total trade,

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3 An offtake agreement is that between a producer of a resource and a buyer of a resource to purchase/sell portions of the producer’s future production.
has also signed an FTA with Australia but it is yet to enter into force. Australia is also pursuing two bilateral FTA negotiations with India and Indonesia, and four plurilateral FTA negotiations through the Trans-Pacific Partnership Agreement (TPP), the Gulf Cooperation Council (GCC), the Pacific Trade and Economic Agreement (PACER Plus), and the Regional Comprehensive Economic Partnership Agreement (RCEP). Currently the countries covered by current negotiations account for a further 6% of Australia’s total trade (DFAT 2015b).

In the Australian Government’s Agriculture Competitiveness White Paper released in July 2015, the FTAs with Japan, Korea, and China are highlighted as vehicles for easing the way for increased export of agricultural products to Australia’s major trading partners. A review of past government documents relating to earlier FTAs, including the Australia-United States FTA, reveals similar celebratory pronouncements. However, a closer examination of these agreements and the outcomes to date raises the question as to whether or not these agreements will deliver the trade outcomes promised. There are still significant TTBs in each of these agreements, as well as a staged approach to the reduction of tariff barriers, particularly in the Australia-United States FTA.

In its assessment of the Japan-Australia Economic Partner Agreement (EPA), Rabobank in its publication, *Agriculture in Focus: Competitive Challenges – Getting on the Global Market Access VIP List* (2014), provides an analysis of the outcomes of the FTA in relation to six different sectors: beef, dairy, rice, sugar, wine, and horticulture. Beef, wine and horticulture are given a “pass” rating as the agreement reduced or eliminated tariffs for these sectors (with a slow phase in for tariff reductions on beef while biosecurity measures are maintained, which limit the quantity of beef that Japan will take thus slightly moderating this positive result.) Dairy, rice and sugar are given a “fail” rating as tariffs were either not reduced (70% tariff in the case of sugar) or the product category (rice) was excluded from the agreement altogether (p. 4). So while it can be argued that the FTA with Japan is clearly beneficial to some sectors of Australian food and agriculture, it does not benefit all sectors equally, and indeed some not at all. The Japan-Australia EPA, therefore, like others before and certainly after it, might be more appropriately termed a liberalised rather than free trade agreement.

As for the China-Australian FTA, the National Farmers’ Federation put out a report card in November 2014 that gave an “outstanding” rating to four categories, namely, dairy, beef
and veal, sheep meat, and horticulture. For other categories, wine received a “major improvement” rating, cotton seed, greasy wool, grains, pork and poultry received only a “minor improvement” rating, while sugar and rice they were assessed to receive a rating of no change at all. Even for those categories deemed to be “outstanding”, the report noted that for most there will be a delay of between 4 to 11 years before tariffs are eliminated. (The only category for which tariff elimination begins in under 4 years is hides, for which tariffs begin reduction in 2 years to be phased down to zero in 7 years) (NFF 2014).

This is not to say that existing FTAs are not providing benefits to Australian farmers and food producers, as indeed they are. One example provided in the 2015 White Paper relates to cherry exports to Korea, which, as a direct result of the Korea-Australia FTA, has seen the value of cherry exports increase from $69,000 in 2013-14 to $3.5 million in 2014-2015 (p. 120). Cherry exports to Japan have also increased by 35% over the same period (to $280,000) as a direct outcome of the Japan-Australia EPA. However, as the paper goes on to explain, the only state that has benefited from increased cherry exports is Tasmania as it is the only state in Australia that meets the strict quarantine restrictions imposed by both Japan and Korea (even though both NSW and Victoria produce the same quantity as Tasmania, if not more). Quarantine restrictions are an example of a TTB, the latter often remaining when tariffs are reduced. In the case of cherry exports to Japan and Korea, without changes to biosecurity classifications or assistance in overcoming the difficulties that have led to the negative classification of cherries grown in NSW and Victoria, Australia will not be able to compete with either Chile or New Zealand, currently the major suppliers of cherries to Japan, Korea, and China. It is important, therefore, that while the Australian government pursues the reduction of tariffs in its FTAs negotiations with our current trading partners that this should not be the sole focus of their efforts. Ensuring that TTBs are also reduced is equally important.

A further concern in relation to FTAs is that changes in government policy driven by internal political factors regarding agricultural imports can impact profoundly on seemingly secure exporter markets. For example, China’s growing middle class and its demand for high quality, safe food has become a cliché in Australian agriculture circles. However, China has the land mass and natural resources required to become self-sufficient in food production thus threatening the viability of China as a long-term market for Australian food exports if in the future its government chooses to focus on self-reliance as a part of wider government policy
or due to market contraction. A current example can be drawn from New Zealand where farmers have experienced a period of “golden years” since the signing of the NZ-China FTA in 2008. Volumes for milk powder (as well as other dairy products) have increased significantly since the agreement was signed (see Figure 1 below), but have turned down in the period 2014-15. Total exports to China in February 2015 were worth NZ$740m, down more than 36% on the same month in 2014. While China remains New Zealand's biggest export market, worth almost NZ$9b in 2014-15, the downturn in the Chinese economy has had a significant impact on Chinese ability to absorb dairy exports from New Zealand.

![Figure 1: Dairy Export Price and Volume Indexes (1992-2012)](source: Statistics New Zealand (2013))

The vulnerability of exports markets to changes in government policy is further exemplified in the case of Indonesia, which announced in July 2015 a reduction of beef imports from Australia from 250,000 head for the following quarter to 50,000 (Brann 2015). Although the Indonesia-Australia Comprehensive Economic Partnership Agreement has been under discussion between the two countries for the last 6 years, with negotiations intensifying in the last 2 years, a final agreement would not guarantee a similar occurrence not happening again. If the IACEPA is successful, it simply ‘aims to strengthen and expand the trade, investment and economic cooperation relationship between Australia and Indonesia’ (DFAT 2015c) but would not necessarily remove Indonesia's sovereign right to limit live cattle imports in order to protect its producers. The vulnerability of Australia’s cattle producers to the vagaries of the Indonesian-Australian political dance thus remains.
What, then, does all this mean for farmers in Australia’s regional areas? In short, even if FTAs are beneficial in the long run, it may be some time before regional areas see any benefit. In the intervening years, the economic cycle is more likely to impact on farmer welfare than are FTAs. Therefore, regardless of the ability of an FTA to liberalise trade and open up markets, it does not provide a ‘magic bullet’ that eliminates risk from the market. Whilst undoubtedly FTAs should be pursued, these equivocal evaluations suggest that an alternative framework for enhancing regional growth through agricultural export should also be pursued.

The way forward

In looking beyond FTAs as the sole focus of policy initiatives aimed at securing greater access to Australia’s agricultural markets, a more considered approach would be to:

- work on speeding up the reduction/removal of tariffs within the existing FTAs;
- work on removal or reduction in TTBs that work to counteract the positive effects of tariff reductions contained within the existing FTAs;
- provide technical as well as trade assistance to regions that are unable to take advantage of the FTAs due to biosecurity classifications or concerns. The 2015 White Paper lists several initiatives designed to assist agricultural businesses in exporting to FTA partners (pp. 117-8). However, these measures are targeted at export market establishment and not on the issues that would help these businesses overcome the TTB;
- continue with negotiating trade agreements, but shifting focus to countries that have an ongoing inability to be self-sufficient in food production and have developed or are developing trade and investment strategies for long-term food security, for example, the member states of the GCC; and
- notwithstanding progress on FTAs, increase focus on the opportunities afforded to regional Australia through the specific demand profile of GCC countries (as discussed below).
Capturing high-value premium markets in food net importing countries that are seeking trade and investment opportunities for long-term food security: considering the value to Australian agribusinesses of a FTA with the GCC

Food Security: the GCC Demand Profile

A country has food security when at all times its residents have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs for a healthy and active life in personally and culturally acceptable ways (FAO 2008). Many countries fall short of this benchmark to varying degrees, with some reliant on imports for all or most of their food where there is a severe lack of arable land and/or potable water. In the case of the GCC countries, all are high net food importing countries, with Bahrain, Kuwait, Qatar, and the United Arab Emirates dependant on more than 90% of food imports to meet national needs (FAOSTAT 2015). Combined with economic development derived from significant oil and gas revenues, the GCC’s growing middle and wealthy class are, like their counterparts in Asia, transitioning to a more meat and dairy based diet (Sadik, El-Sohl & Saab 2014). Dependence upon food imports has thus been rising steadily, as Figure 2 indicates, with the gap between low food production and growing populations estimated to reach 50 million by 2020.

Figure 2: High levels of GCC food imports due to low food production capacity (2010)
Following the outbreak and rapid spread of violence across the Middle East in late 2010 (the so-called “Arab Spring”), a number of GCC states, in an effort to mitigate the risk of a food shortages as a trigger for political unrest, have developed food security strategies that focus, by necessity, on securing access to food imports in times of global food shortages or regional geo-political tensions (Author interviews in Kuwait, Oman, Qatar, Saudi Arabia, and UAE, 2014). Whilst these strategies are yet to be fully realised and their long-term impact yet to be determined, a number of lessons can be drawn from early efforts made in off-shore investment. The most well-known is the so-called ‘land grab’ policy, which has seen a number of GCC states buying up agricultural land in low socio-economic countries that are often themselves food insecure. Having spent millions of dollars in the process, most deals have failed to meet their objectives due to a number of reasons, including host country sovereign risk, a lack of host country infrastructure, and a lack of expertise in land and farm management (Shepherd 2013; Woertz 2013).

A new methodology: meeting the needs for both food security and investment returns

As a counter to these challenges a new more holistic approach has been sought by some GCC governments that extends beyond simple offtake or land purchase agreements to achieve a more long-term, financially sustainable food security strategy. This provided the opportunity for the authors to develop a food security and investment strategy for one GCC country that sought alignment of both food security and profitable trade and investment needs for the medium to long term.

The methodology used to develop this strategy, which sought to achieve optimal aggregate value for a given minimum on both food security and trade and investment returns, was driven in the first instance by identifying the key needs of the investor and respective stakeholders through the following process:

1. Working with stakeholders to define the concept and measurement of the country’s food security requirements thus enabling a determination of the social value of the intended investment;
2. Quantifying the trade-offs of the social and financial dimensions under different strategy scenarios;
3. Working with stakeholders to identify the optimal strategy based on the computed trade-offs and dual objectives;
4. Identifying the most efficient implementation mechanism by taking a holistic view across all stakeholders within a medium to long term time frame; and
5. Identifying the avenues and content for communication of the process with all stakeholders.

As a result of this process the authors identified two key factors:

- The existence of trade-offs between the level of profitability and the level of food security expected to be achieved from the investment strategy; and
- A desire by the investor to meet a minimum level of both food security and profit outcomes as opposed to focusing primarily on one or the other.

The Dual Mandate Framework

Through this methodology the authors crafted an investment strategy, which they coined “dual mandate” to capture the above key factors. The dual mandate investment strategy was underpinned by the following characteristics:

- Long term trade based relationships with net exporting countries;
- Joint venture investment in exporting country’s infrastructure and logistics; and
- Collaboration with investee countries/businesses to create new value, as opposed to a simple transfer of existing value.

A dual mandate approach to trade and investment for long-term food security (thus addressing both financial and non-financial objectives) is different in a number of important ways to a traditional method of investment and has important strategic implications for both investor and investee in regards to both the structure and characteristics of preferred investments. These differences, that in turn frame a dual mandate investment, are captured as follows in Figures 3-5.

Figure 3 below illustrates the traditional framework in which investee enterprises compete on the basis of profitability, reflected by the return/risk metric on the y-axis. In this case there is an absolute minimum level for an investment/engagement to be considered (for example
NPV=0) with a comparative preference for higher over lower return/risk expectations above that minimum. In this case, investee countries or businesses are competing on a single mandate of profitability (adjusted for risk).

Figure 3: Traditional Investee Framework

![Figure 3](image)

Figure 4 indicates the inclusion of food security as a second dimension on the x-axis. For a dual mandate to be operational, food security is not simply added as an additional metric of value, but rather it is mandated into the investment decision making framework as a minimum deliverable.

Figure 4: Inclusion of food security on the x-axis

![Figure 4](image)

This gives rise to a genuine shift in the investment outcomes well beyond a peripheral impact on the behaviour of the actors on both the buy and sell side, as captured in Figure 5.
Figure 5 shows that when there is a minimum mandated food security outcome the most desirable investment projects are those that meet the minimum expected outcomes on both food security and financial returns, even for a lower return/risk outcome. This assumes the two findings outlined above, namely:

- The existence of trade-offs between the level of profitability and the level of food security expected to be achieved from the investment strategy – the upper right quadrant is generally unattainable; and
- A desire by the investor to meet a minimum of both outcomes as opposed to focusing primarily on one or the other

Understanding the Food Security Mandate

By taking into consideration the definition of food security provided above, and applying the above methodology and dual mandate framework to an assessment of the opportunities afforded by investment markets, the authors identified five outcomes that could be achieved through a dual mandate approach to investment in global food markets and that would contribute positively to the investing country’s food security. These five investment outcomes are:

- Access - to the underlying assets and commodity
- Influence - in political forums and food markets
- Hedging - against spikes in prices that put food affordability at risk
- Knowledge - of food markets embedded into the investee country
- Expectations - of food security by all stakeholders

In Table 1 each of the five investment outcomes are matched with an associated food security benefit identified by the authors thus indicating the ‘dual value add’ gained from a ‘dual mandate’ food security investment strategy.

Table 1: Investment Outcomes from a Dual Mandate Food Security Investment Strategy

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>INVESTMENT METHOD TO ACHIEVE OUTCOME</th>
<th>BENEFITS OF OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>Economic interest in food production, processing and infrastructure</td>
<td>Access to long-term sources of secure production</td>
</tr>
<tr>
<td></td>
<td>Long-term offtake agreements supported by joint venture and political relationships, with net-exporting food countries</td>
<td>Access to a variety of mechanisms and levers to address short term risk scenarios</td>
</tr>
<tr>
<td></td>
<td>Significant ownership in food related companies</td>
<td></td>
</tr>
<tr>
<td>Influence</td>
<td>All above, and minority but substantial investments in large multi-national food related companies</td>
<td>Capacity to influence food outcomes in both market and political forums</td>
</tr>
<tr>
<td></td>
<td>Engaged involvement in the governance of investments</td>
<td>Capacity to negotiate better outcomes in short term risk scenarios</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity to negotiate better outcomes under various economic, environmental or political scenarios</td>
</tr>
<tr>
<td>Hedging</td>
<td>All above, and investment in storage capacity in collaboration with private sector</td>
<td>Capacity to use profits from food related investments and products to subsidise the impact of higher food prices on global markets</td>
</tr>
<tr>
<td></td>
<td>Optionality over commodity assets</td>
<td>Ability to hedge short-term buying requirements through economic access to the product</td>
</tr>
</tbody>
</table>
**Knowledge of food markets embedded into the investee country**

<table>
<thead>
<tr>
<th>INVESTMENT METHOD</th>
<th>INVESTOR PERSPECTIVE</th>
<th>OPPORTUNITY FOR REGIONAL AUSTRALIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic interest in food production, processing and infrastructure</td>
<td>GCC demand is not necessarily to buy an asset outright, but to invest with a joint venture with the local operator, reflecting the perspective that local economic ownership is key to ensuring engagement of local knowledge and talent. The GCC demand profile extends beyond land only and into processing and</td>
<td>This affords current land and asset owners in regional Australia access to capital to scale production to efficient levels that may have otherwise been unavailable. This expands opportunities beyond individual businesses to the regional level, presenting development</td>
</tr>
<tr>
<td><strong>Long-term offtake agreements supported by co-investment and political relationships, with net-exporting food countries and Optionality over commodity assets</strong></td>
<td>Infrastructure, reflecting the perspective that without the ability to take the product to global markets, the food security benefits to overseas investors are minimal.</td>
<td>Agencies and governments with the potential to engage with investors in capacity building.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>GCC investors will consider less profitable short-term parameters in exchange for a long term offtake agreement, reflecting the perspective that access under a certain risk scenarios will rely on a deeper relationship in this case underpinned by co-investment.</td>
<td>Producers can increase output with some certainty around demand for the incremental product. Producers can increase profit in return for entering into long-term arrangements which enhance the investor’s food security.</td>
<td></td>
</tr>
</tbody>
</table>

| **Engaged involvement in the governance of investments and Visibility over the operations of key investments** | Although the demand is for joint venture investment with the local team responsible for operations, GCC investors may seek an engagement in governance and/or visibility over operations as this will provide an opportunity to accrue relevant knowledge for effective participation in economic and political forums and improved investment performance. | This provides an opportunity for regional Australia to work with GCC investors to develop mechanisms for appropriate engagement and visibility, providing food security benefits which offset financial return expectations. |

| **A marketing strategy underpinning the investment portfolio and associated food security benefits** | Given the importance of expectations, both in domestic and international markets, GCC countries will look for certain investments to take a high public profile | This provides an opportunity for regional Australia to work with GCC investors to develop marketing and communication strategies, providing food security benefits which offset financial return expectations. |
Key among the lessons learned by GCC governments when in the past they have pursued a strategy of purchasing land in low economic developed countries in the hope of exporting food back to their home markets is that purchasing land or taking on a lease without an associated management agreement is subject to gross mismanagement and loss of substantial investment funds (as well as falling far short of achieving food security objectives) (Woertz 2013). The benefits, on the other hand, of entering into joint ventures with experience land and other agribusiness owners who remain engaged in the management of their business, are substantial. As one Australian agribusiness investor explained:

Effective land management is a highly developed skill specific to the geography and product of each farm, and not easily replaceable. Additionally, given the limited access to quality financial information in the farm sector, and the inherent information asymmetry to the advantage of the vendor, the buyer is at a disadvantage in selecting high performing assets. These mismanagement and adverse selection risks can be significantly reduced with land ownership through a joint venture where the vendors remain working in an active management capacity where their financial outcomes remain directly linked to farm performance.’ (Author interview, January 2015).

Conclusion

The Australian Government’s recent success in adding Japan, Korea, and China to the growing list of countries with whom it has signed a FTA is indeed cause for optimism as greater access to Asian markets and increased exports holds out the prospect for increased development and prosperity in regional Australia. However, this paper has argued that FTAs are not a magic bullet for removing all tariffs and TTBs, and other avenues for boosting exports should be sought. With this in mind, the authors’ experience in developing a methodology for a food security investment strategy for a member state of the GCC has provided insight into how GCC countries are looking to secure long-term, sustainable food imports and joint venture investment opportunities through a dual mandate strategy to address their acute food security challenges. It is hoped that these insights might point the way to capturing opportunities for regional businesses in the agricultural sector to pursue long-term, engaged and mutually beneficial partnerships with GCC countries in pursuit of national food security through trade and off-shore investment. Whilst mutual benefits exist regardless of an Australia-GCC, these would be greatly enhanced by successful FTA negotiations that also achieved the removal of tariffs and TTBs.
Reference List:


Communication, Networks and Development in a Rural Community in Queensland

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Communication, Networks and Development in a Rural Community in Queensland

Abstract

Communication is fundamental to the capacity of communities to identify problems, specify goals, and gather resources required to implement solutions. Despite the wealth of research on rural community development in Australia, little has been done to understand how communication occurs within and between communities.

This paper presents a case study of communication and resource access in the rural Queensland community of Goondiwindi. Key informant interviews were conducted to identify methods of communication used to ascertain community needs, propose solutions, receive and share information about funding opportunities, and share information and knowledge with other communities.

Results highlight the significance of existing community networks – both personal and professional – and the role of key individuals in allowing relevant information to travel, as well as the ongoing importance of both traditional and social media.

The paper also discusses a ‘passerby’ effect raised by research participants: word-of-mouth generated by information presented physically within the community (new infrastructure, noticeboards, installations).

Keywords: rural development, community development, communication, networks, social capital

Introduction

Communication is fundamental to the capacity of communities to identify problems, specify goals and gather resources required to implement solutions. Information channels facilitate collective action (Coleman, 1988), and communication is interconnected with the exchange of resources and information (Gill, 1983). If, as O’Brien et al (1991) state, rural communities’ development needs involve accessing external project funding, gathering information about alternative solutions to local challenges, and developing community capacity to pursue common goals, then communication is vital for addressing these needs. Without
communication channels between funders and communities, external funding opportunities cannot be pursued; without effective communication within communities, solutions to problems cannot be shared, discussed and developed; and without the movement of information between communities, there is a greater risk of duplication of effort (Gill, 1983), and less space for collaboration.

Despite evidence of the importance of communication pathways and processes, little has been done to date to understand how communication occurs within and between rural communities. Communications research in a rural Australian context has tended to focus on telecommunications and media, despite evidence that strong interpersonal and informal communication exists, and contributes to development of social capital and community capacity. A better understanding of the variety of communication methods already in use to address development needs will allow both rural communities and funding bodies to more effectively share information, and address gaps or areas of weakness.

**Background**

*Communication, Development and Resource Access*

Communication has long been at the heart of theory and practice of community development. In the mid-1900s it was associated with modernisation processes in underdeveloped or developing societies (Lerner, 1958) and largely represented by unidirectional, linear flows of information, generally via media (Tufte & Mefalopolus, 2009; McPhail, 2009). Since the 1970s there has been a significant shift toward participation, repositioning the role of communication to one of empowering community members to take collective action (van de Fliert, 2010; Tufte & Mefalopulos, 2009), set their direction, develop themselves and instigate social change in a bottom-up manner (Jacobson & Kolluri, 1999; Gumucio-Dagron, 2009).

Herbert-Cheshire (2000) argued that ‘notions of community, self-reliance and self-help’ were beginning to appear in discourses of Australian regional and rural development (p. 204). She identified a belief that rural communities ought to self-develop and that they had the capacity to generate ideas and projects, but that they had difficulty accessing the resources required to put development into practice.
Communication and Social Capital

Social capital has been shown to play a significant role in allowing communities to access these informational and financial resources. The connections, networks or ‘bridges’ which constitute social capital are seen to have a range of positive effects, from fostering and reinforcing trust and respect (Granovetter, 1973; Coleman, 1988) to promoting collective action (Lin, 2001) and allowing access to resources (Tonts, 2005; Hofferth & Iceland, 1998).

Research suggests informal and less mediated forms of interaction are essential to the generation of social capital in rural communities. Tonts (2005) found that sport was a key generator of social connectedness in Western Australian rural communities. Bourke (2001) saw participation in sporting clubs as affecting the flow of information within communities. Participants in Birchip Cropping Group’s (2008) research on the impact of drought told interviewers that community members ‘talk very openly’ in social spaces (p. 54).

In their study of social capital in a small rural Australian community, Falk and Kilpatrick (2000) concluded that more research was needed on the many forms and channels of interactions which build and use social capital. Maras (2003) argued that social capital theory tends to overlook communications infrastructure – everything from conversations to media – which supports social relations.

Beyond Mediated Communication

The rural development literature in Australia has tended to address communication in the context of media or telecommunications. Many scholars agree that access to telecommunications infrastructure and services assists with rural development and sustainability, and that infrastructure distribution favours metropolitan areas (Hill, Burgan & Troshani 2011; Barlow 1997; Bandias & Vemuri 2005). However, Graham (1995) noted that simply providing access to telecommunications infrastructure did not solve social and economic challenges, and argued it was important to ensure community members were able to participate in change processes.

Aim and Objectives

The existing literature shows that communication is occurring in a variety of ways to contribute to movement of information within and between rural communities, the creation of the social capital these communities actively use to effect change, and the empowerment of community members to participate in their own development. What is less clear is which methods of communication are being used by these communities, and what barriers exist to effective and
valuable information-sharing. The aim of this research, therefore, was to understand how members of the Goondiwindi community communicate to share needs and ideas, and to access external funding to achieve their goals and create local change.

The objectives were:
- To identify methods of communication used to share ideas, needs and solutions, within the community.
- To identify methods of communication used to receive and share information about funding opportunities.
- To identify methods of communication used to receive information from, and share information with, other communities.
- To identify barriers to effective communication.

**Research Methods**

The study was a small-scale exploratory case study of the community of Goondiwindi, a rural town on the border of Queensland and New South Wales. The community of approximately 5,500 people has a strong agriculture and business base, and is a service centre for local cotton, grain and beef industries. A case study approach allowed communication methods and issues to be identified and described in the context of the community of Goondiwindi (Somekh & Lewin, 2005). It also suited the small scale of the research.

The research was based on a framework of criteria and indicators that informed the research questions (Figure 1).

![Figure 1: Research Framework Relating Research Questions to Criteria for Measurement](image)
From the existing literature, criteria were identified relating to different avenues of communication: traditional media, social media, informal word-of-mouth, formal organisational networks, and personal networks. Interview questions were developed with each question relating to each criterion. This provided a clear research framework allowing interview responses to inform research criteria and consequently research questions. Interview questions were pre-tested and validated.

Key informant interviews were conducted with members of the case study community. Due to the small size of this exploratory study, random or broader sampling was not feasible or appropriate. Seven key informants were identified through a purposive “snowball” sampling approach, to make use of community networks and understanding of where knowledge was held. Of the seven informed respondents, two were employees of the Regional Council; one of the Chamber of Commerce; two worked for local nonprofit organisations; one for the local Landcare group; and one was a local business owner.

Six of the seven interviews took place in person. The seventh key informant participated via phone interview. Interviews lasted approximately one hour on average.

Interviews were digitally recorded, transcribed and analysed to identify the key themes and ideas raised by respondents. Interview transcripts were openly coded manually. Given the exploratory nature of this case study (Gerring, 2007), an inductive approach – in which codes were derived from the data rather than predetermined – was warranted (Guest, MacQueen & Namey, 2012). Codes were then manually aligned with themes. A high level of reflexivity was maintained, during both collection and analysis phases, to consciously look for new perspectives on the data. (Alvesson, 2011).

**Small Scale**

The study took a small-scale exploratory approach to identify themes and practices which may warrant further, more extensive study. While a clear research framework was used, the conclusions drawn were limited by the number of respondents and the case study context of the research. Broader conclusions could not be reliably drawn from the data. For example, issues relating to Indigenous communities, or resentment towards funding processes, were related to, but beyond the scope, of this study, and could be the subject of future research, building on this initial work.
A key ethical concern was maintaining participant confidentiality, particularly in the context of a case study community where participants knew one another well. Key informant responses have been identified only with broad organisational affiliations (e.g. Regional Council employee).

Results

Communicating Needs and Solutions
The key findings were that ideas moved through the community via networks, through gatherings and spaces designated for information-sharing, and through word of mouth. Community networks were supported by use of Facebook, and key individuals who acted as gateways for information. Participants discussed the continuing importance of the local newspaper, despite a perception that it was not a high-quality publication, and several respondents gave examples where information was visually represented within the community.

Networks
Respondents unanimously identified the importance of networks in enabling information to travel both within and outside the community. Networks existed between individuals and organisations, and were both mediated (specifically by email and Facebook) and non-mediated (occurring organically between people, and involving word of mouth or informal exchanges).

The most commonly identified networks were memberships of community groups. Respondents placed similar importance on formal inter-organisation networks as they did on social or personal networks.

Three participants said using existing networks within the community allowed information to travel quickly, and was more effective than ‘creating competing ones’.

You’ve got to be diverse in the different networks, [make sure] you’re sending out through the school newsletters, through the pony club, through AgForce connections, [sending] out through as many of those different connections as you’ve got. Also it’s got to be newspaper, it’s got to be radio, it’s got to be social media… if you really want to get it out there I think you’ve got to do all the different mediums, that way you have something that can get to everyone. (Local Landcare representative)

When sharing ideas within the community, respondents emphasised informal networks, or networks between individuals. Communication with other communities tended to rely more
on formal or organisational networks. One respondent highlighted a crossover between organisational or professional networks and more personal ones, noting that ‘most of us are also involved in a lot of organisations’.

Facebook
Responses indicated that Facebook\(^1\) played a key role within the community as both a platform for networks and a facilitator of interpersonal communication.

One respondent called Facebook ‘today’s word of mouth’ and said that it was particularly powerful because ‘you reach a lot more people with one thing on Facebook than [with] one conversation’. Because individuals were connected to both personal and organisational networks on Facebook – for example, as well as friends and family they may follow their Landcare group or sporting club – information could move between these networks once shared.

Another interviewee suggested Facebook had begun to play the role of ‘letters to the editor’ for younger people in the community, providing a space to air concerns or express needs. However, most respondents felt that the perception that ‘Facebook is for young people’ was incorrect, and that community members of varying ages were active users.

Respondents involved with Council and the Chamber of Commerce saw Facebook as an effective communication method because it was two-way, allowing community members to respond to, as well as receive and share, information.

Forums and Spaces
The preceding example suggested that Facebook supported not only networks but also spaces for discussion and information-sharing. Two respondents brought up the Goondiwindi Noticeboard (GNB) and the Goondiwindi Plus More\(^2\) Facebook pages as sources of community information and engagement, allowing people or organisations to post questions and receive responses about community issues or ideas for community improvement.

Other participants also identified in-person spaces such as meetings, forums and conferences as playing an important role. Four respondents felt that these spaces allowed individuals – either from the same organisation or a range of organisations – to effectively

\(^1\) Aside from one reference to Twitter being ‘too time-consuming’, no other social media was discussed.

\(^2\) Goondiwindi is one of four trial sites for the State and local government-funded Our Town Plus More program, which uses a specifically designed software platform to create online ‘community and business hubs’ for the purpose of community engagement and local connectivity. See https://ourtownplusmore.com.au/
discuss needs and solutions. Two added that in-person gatherings provided an opportunity to hear about what was already being done in a particular sector or interest area, and to share successes, as well as generating ideas and proposing new activities.

*Being able to go to conferences and things like that and hear people talk about things that they’re doing in their community, that they see as quite normal but really the rest of us are like ‘that’s brilliant, we’ve never been able to do that, how did you that kind of stuff?’*, I think [that] is really great. (Local business owner)

One respondent also suggested that these in-person spaces could overcome demographic divisions, and allow community members of different ages to hear one another’s views.

*The ‘Passerby’ Effect*

Respondents identified physically represented information relating to community projects – such as displays and new infrastructure – as an effective form of communication.

*It’s trying to find the spaces where you’re actually going, I mean even simple things like old noticeboards in some towns works just as good as anything else. You still have things outside shops with the old community noticeboard where you put a poster on it and people go and look at that every week. So they’re still an effective way of communicating in certain places because people still go and look at them.* (Regional Council employee)

Three participants gave examples of information travelling as a result of being seen within the community. The first was from the neighbouring town of Texas (in the Goondiwindi Regional Council area), where the school had been given use of one of the library windows to display information about the school’s activities to people who did not have children enrolled but who remained interested.

Another participant involved in organising community events in Goondiwindi noted that there was a good response to posters distributed to local businesses, and to a chalk drawing in the street outside an event venue, but that both of these were successful in the context of other communication: for the first event, advertising in the *Goondiwindi Argus* newspaper, and for the second, a social media campaign.

For a third participant, the impact of this ‘passerby’ effect extended beyond the Goondiwindi community, explaining that when a new PCYC was built, a number of other local Governments approached the Council to find out more about the project.
They were in town – the councillors or the staff [were] in town. Someone said, ‘wow, that’s what we need’. And that’s happened with a number of projects around here. If they’re here for an event, if they’re just passing through, they say, ‘wow, we need one of them, we’ve talked about it for a while and that’s exactly what we need’. They’ll ring me or ring someone and we’ll send them the information through. (Regional Council employee)

Willingness to ask

The PCYC example also demonstrated a willingness to ask for information which was echoed by other participants. Two discussed instances where people from outside Goondiwindi had seen or heard of projects occurring and had made contact with someone locally to ask questions about how the project was being undertaken, in order to inform their own community. These questions were posed both of organisations (particularly Council) and of individuals (through personal connections).

One respondent saw this willingness to ask as specific to the region rather than the Goondiwindi community:

I do reckon people west of the Range are really happy to pick up the phone and just ring somebody. I think it’s just being able to make some calls and do some research and follow up. I’ve had phone calls from people in Dalby and Katherine and central New South Wales and somewhere else and somewhere else... (Local business owner)

Word of mouth

Within the community, word of mouth was seen by most participants to play a key role in allowing information to travel, and to move information from the community into more formal networks or channels.

One participant suggested that ideas were generated ‘just through conversations in the community, it might be through sporting events’, a concept that was echoed by another respondent:

It could be that an idea sparks up with the ladies’ touch football or at the netball or at Business After Hours, and then that information is then taken into that formal area so it’s not a documented channel and it’s not something that that you write down or you record or anything like that, but it then is fed up through those formal avenues of communication and then you get the planning stuff happening. (Chamber of Commerce representative)

One respondent noted that despite the strength of word of mouth (‘one person will always tell another person something, so there’s no secrets in this town’), negative news (for example, an accident) was much more likely to travel than positive news (a community event).
Closely linked to the power of word of mouth was the idea, raised by four of the seven participants, that community members had direct and often personal access to leaders when it came to sharing ideas or information. Respondents felt the size of the community was responsible for the ability for ‘the general public’ to run into local councillors at events or ‘hit them up at Coles’, and suggested that in comparison to larger centre ‘everybody knows each other a bit more intimately’:

*I think the benefit we have in smaller communities is we have greater access to those formal roles of leadership, we see the mayor regularly, all of the councillors know who you are and what you do... And I think that’s really important from a funding point of view because then you can actually say ‘hey, you’re the Mayor, RDA’s got funding out at the moment, you know, Goondiwindi really wants a swimming pool...’* (Local business owner)

A respondent involved with the Council confirmed this, saying that ideas tended to reach them through informal channels first ‘because the Councillors are part of the community, they know what’s going on’.

**Key individuals**

Another method of ensuring information was effectively shared within the community was to provide it to the ‘right people’. Five of the respondents referred to key individuals within the community who played a pivotal role in ensuring information moved between individuals and organisations. There was a general consensus that these were well connected and fairly proactive people:

*They’re the ones that probably have that connectivity in the community, whether it be through family or various organisations they might be volunteers for; they might be just people that are very friendly, vocal sort of people that have a lot of contact with other people or have an interest in a certain area. You normally know who those people are in the community. And they can get messages out there for you.* (Regional Council employee)

Two of the respondents were identified by others as some of those individuals, and also self-identified as playing that role. Three participants, including the two identified, also suggested that the role was not only one of sharing information, but also actively seeking it out. They did this by ‘listening to the community and trying to pick up on those things where people [are] just casually talking’, and by linking those people with others with similar or complementary ideas.
Newspaper

Almost every respondent indicated that the local newspaper, the Goondiwindi Argus, remained a key source of information within the community, but four participants referred to its small size and limited content.

They indicated that reading the paper was as much related to local tradition or culture as to seeking to be informed.

[The Argus] has a lot of pull... Maybe there aren’t as many interesting articles for people to enjoy [in] the newspaper but the fact of the matter is that they still purchase it. And they’re still reading, and the good thing about the Argus that we can’t get away from is that people still love things that are in print, people still love things that they can look at and cut out their picture if they’re in it. (Chamber of Commerce representative)

Another respondent said that although it ‘only takes you five minutes sometimes to read’, people still read it, while a third said that ‘when you read it you go, ‘well, I don’t know why I bothered, there’s nothing in it’, but the week you don’t pick it up you miss something’.

Because of this, there was a common view that failing to use the paper as a communication channel would result to a significant portion of the community missing out on access to particular information.

Three participants saw the local paper as of particular interest to older community members, but one also felt there was an aspect of overcoming technological or socioeconomic barriers:

Particularly [in] the rural areas, like not everyone’s got access to the internet and not everyone’s techno savvy, particularly the elderly people... I still think the media is saying that they’ve still got the obligation to have the hard print for those who are less fortunate. (Regional Council employee)

Two participants suggested that in a news environment where the weekly paper no longer broke stories, it has a role to play in sharing successes. While one respondent felt this was a space the Argus should move into, the other believed that this was already occurring and that community groups or businesses that received funding would be pictured in the paper.

Receiving and Sharing Funding Opportunities

According to respondents, external funding opportunities tended to reach the Goondiwindi community through three channels: email networks; organisational networks; and proactive searching by community members.
Five of the respondents reported being connected to emailing lists, while four indicated that they would actively use the internet to search for funding rounds. Two interviewees said that they received information through industry-specific networks that operated at national, state and regional levels.

Once the information was within the community, respondents agreed that it tended to be shared effectively, particularly by word of mouth and a willingness to ask questions of others. Respondents gave examples of information being shared both before the fact (when funding opportunities became available) and after (once they had been successful in attracting funding and could advise others).

Two respondents spoke about the need to be well connected from different perspectives. One said that ‘conversations [about funding] just happen’ through existing connections, while the other felt that word of mouth was not as effective ‘for some of us [who] haven’t got those strong connections’ to funding sources.

Most respondents indicated that they either shared information, or received information that was shared, with only one interviewee bringing up the possibility that increasing competition for funding would interfere. Two participants said they had seen funding opportunities shared on Facebook.

Respondents saw both key organisations and key individuals contributing to the movement of information regarding funding opportunities. They referred to the Council website, the Chamber of Commerce, and other community committees as sources, while the two respondents previously identified as ‘gateways’ of information within the community were again named.

**Communicating With Other Communities**

Five of the seven interviewees raised the importance of spaces – generally meetings or conferences conducted within organisational networks – to communicate with other communities. Several noted that there was time and effort involved in physically bringing people together from regional communities, but that doing so provided valuable opportunities to overcome professional isolation, connect with peers, share information and knowledge.

*It’s about sharing ideas and especially around problem solving, it’s also about making sure that someone isn’t doing it too tough because they don’t know about something else that’s being done... We make it three times a year we all get together, we have a round robin so everyone talks about their own centre, what their issues are, great things that have happened, not-so-great things that they’re dealing with, and then from that, because everybody sits and listens to everyone’s story, it offers the opportunity then to communicate that sort of thing.* (Local nonprofit employee)
Most respondents who worked for organisations within the community indicated that they were connected to larger organisational networks, at the regional or state level, which allowed them to receive and share information.

Less formal connections and conversations tended to occur more with other communities and towns in the immediate region, with two respondents referring to personal connections (sometimes facilitated by Facebook) in other communities bringing in information.

Only one interviewee referred to traditional media (Fairfax-owned regional newspapers, the ABC and WIN News) as a source of inter-community communication.

*Barriers To Communication*

Interviewees identified four main barriers to communication: exclusion from networks; community factions or competition; lack of empowerment or capacity; and misinformation.

*Exclusion from Networks*

Respondents gave different reasons for people being outside networks. One respondent suggested there was an ‘old boys’ network’ or an ‘ageist network’ which could make it difficult for newcomers to gain access, but added that she felt Goondiwindi was an ‘open community’, a sentiment shared by several other participants.

Two interviewees made the point that people had to want to be part of the networks and information exchange: a lack of initiative or unwillingness to be actively involved was also a barrier. This was linked to the concern that ‘it’s always the same people sitting around different tables’ and an expectation that those groups would get things done:

*There’s always a key group of people who drive that and that in itself can be a dangerous thing... People think, ‘oh well it may be a bit of infrastructure or it may be programs that we need, I won’t take a stand on that because Care Goondiwindi looks after that, or Gateway to Training looks after that, or that’s the Council’s responsibility’.* (Local nonprofit employee)

One respondent suggested that while some members of the community were vocal about needs, they didn’t ‘see themselves as empowered or powerful or influential to really do anything’.
Factions and Competition
Almost all participants raised community factions or a resistance to collaboration as a barrier to communication, but in most cases they spoke about it in a theoretical way; only one respondent gave a concrete example of someone refusing to collaborate with others in order to achieve success. Several interviewees suggested that groups within the community were becoming more open to ‘looking at the big picture’, particularly when it came to accessing funding.

Empowerment and Capacity
Three respondents noted community members might not share information based on an assumption that either it would not be of use to anyone else, or that everyone already had access to it.

Two respondents also suggested that there was an element of ‘self selection’ in relation to putting forward ideas or projects. Members of the community might not share an idea because they were not confident in its value, or their capacity to get it supported and funded.

In relation to sharing successes, two respondents felt that at times groups within the community did not recognise the value of their own work, and the interest that it would generate with other groups or communities. This meant that they did not communicate about their activities outside their own community.

I think often communities are so busy doing that they forget to or they don’t take time to reflect and acknowledge all the great stuff they’ve done, which means that they’re probably not telling anybody else about their great stuff, not because they don’t want anybody else to know, but just because they haven’t realised that it’s bloody great what they’re doing. (Local business owner)

This respondent added that not-for-profit organisations were sometimes ‘not very good at blowing their own trumpet’, a view that was shared by a second interviewee:

I guess if I’m talking to other people and they’re doing something similar, there’s information sharing [of] what I’ve done, what I’ve found worked or what they’ve done, what they’ve found worked well, but it’s hard to go out there and really promote how great something’s happened, because you kind of feel like people would be like-- I don’t know, it’s a bit awkward. (Local Landcare representative)
**Misinformation**

One respondent also raised misinformation as a possible barrier to effective communication. Word of mouth sometimes posed a threat, as individuals shared partial information, or their own perspective on a matter.

*People might give a part of the information without fully explaining it and then some people take their own spin on it and then away it goes, next thing you know you’ve got a rumour floating around the community that’s not completely right.* (Regional Council employee)

Participants felt that Facebook could both prevent and amplify the issue of misinformation. One believed that Facebook overcame the problem of ‘Chinese whispers’ because information that was written down was less likely to be misinterpreted. If the correct information was provided initially, it would then travel without being changed. However, a second respondent saw ‘a lot’ of incorrect information being posted and then shared on the site.

**Discussion**

The majority of findings were in keeping with the existing literature regarding communication, rural community development, and social capital. In particular, the significance and variety of networks that allow information to travel indicate a wealth of social capital (Alexander, 2013). In addition, the role of individuals within these networks supports earlier findings that the connections of community leaders are linked to community capacity (O’Brien et al., 1991; Brown & Nylander, 1998). The participants’ apparent willingness to ask for and share information points to the existence of ‘norms of trust and reciprocity’ (Stone & Hughes, 2001: para. 2).

A point of concern in some studies, such as those by Calder and Beckie (2011) and Brown and Nylander (1998), has been the possible or actual exclusion from networks of certain members of the community. While this was raised by participants, there was more of an emphasis placed on getting information into networks, rather than getting people connected or creating new networks. As respondents stressed the need for diversity in communication, the inference could be made that most people in Goondiwindi were connected to one or more networks; the onus was also on the communicators to use those existing networks proactively and effectively.

The results have also highlighted the importance of non-mediated communication – be it through informal word of mouth, in spaces specifically designed for sharing or via physical
representations of information. However, the focus of respondents on the need for diverse forms of communication, as well as the broad use of Facebook and the ongoing significance of the local newspaper, indicate that there is no single preference. Instead, successful communication is inclusive of multiple methods and platforms.

Similarly, newer forms of communication have not replaced the more traditional ones. The role of Facebook in the Goondiwindi community seems in line with Young’s (2011) findings, where the social networking site was used not as a replacement for in-person or telephone conversation but as a supplementary communication tool. Facebook appears to be less a network in itself but a platform on which community networks operate and are, at times, amplified. In addition, the participatory nature of the site and its broad use in the community provides capacity for dialogue and collective action (van de Fliert, 2010).

Bowd’s (2009) study of ownership (both actual and as a community concept) of regional newspapers in Victoria and South Australia showed sentiments that were similar to those presented in this study. Bowd found that older and long-term residents were more likely to read the paper, but that most communities continued to see it as an ‘essential part of the town or region’ (p. 58).

The results which are, if not surprising, least foreshadowed by prior research, are those relating to the ‘passerby’ effect of physically represented information. While there have been some studies on the value and role of information displays within communities, these have tended to focus on technology or multimedia (see for example: Taylor & Cheverst, 2012), which is at odds with the range of examples given by respondents in this research. Taken together with the significance of physical gatherings and spaces for communication – particularly when it came to communicating with other communities – it appears people in Goondiwindi have a preference for ‘getting together’ to share information, or at least that they are not averse to travelling in order to do so. This may be a response to isolation faced by people living in rural and regional areas: because opportunities to gather are fewer, they are considered more valuable.

**Conclusions and Recommendations**

While the limited scope and nature of this study prevent the development of hypotheses or conclusions, it does suggest areas for further study. Understanding the way information travels will enable the Goondiwindi community to capitalise on opportunities and address barriers. In
particular, there may be opportunities to better strengthen networks, facilitate in-person spaces for information-sharing, and address lack of empowerment as a barrier to communication.
References


Research on Index System for Eco-city: A Case Study of Xiuyuan Eco-city in China

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ABSTRACT: Eco-city construction is an important way to combat climate change and to develop sustainably. Recent years, the Chinese government has established policies to incentive eco-city construction. It is required to make an index system before the construction in order to definite orient of the city and responsibilities of relevant stakeholders. Existing researches failed to summarize compilation methods and steps of index system with good operability. Establishing of index system for eco-city is still lack of paradigms. This paper researches basic theories of eco-city such as the significance, principles and hierarchy of index system, as well as the classifications of indicators. The article elaborates the methods of establishing an index system and steps of determining indicator values with general applicability. To make these theories to be understood easily, this paper takes the case of Xiuyuan Eco-city in China for instance, analysing methods and steps aforesaid. Results from the analysis show that to establish an index system, one should first take the reference index made by the Chinese Ministry of Housing and Urban-Rural Development as a template, and work out the target layers and method layers, then make sure the index layers and determine indicator values based on situation of the city. If the indicator values are reasonable, a sophisticated index system is established; if they are unreasonable, one should repeat previous work to make them better.

Keywords: Urban planning; Eco-city; Index system; Green building

Introduction

Owning to the increasingly prominent city issues, we were forced to considerate the construction concepts and development patterns of our city these years. It is urgent to explore a new way to make cities more ecological according to local situations. An eco-city is an energy-saving and environmental-friendly urban area, and it is a relatively new development
pattern under the circumstances of ecological balance.

Recent years, the Chinese government has established policies to incentive eco-city construction. By submitting several documents to local government in March 2015, Xiuyuan has become a provincial eco-city of Shandong Province in China (Figure 1). These documents included *Analysis of the Current Situations, Review of Relevant Urban Planning, Research on Index System, Specialized Planning for Green Energy, Green Building, Green Transportation, Green Infrastructure and Ecological Landscape*, as well as *Implementation Scheme*. With these documents, Xiuyuan was ready to construct a low-energy, low-pollution, low-emission eco-city. Thanks to the distinctive geographical conditions and cultural deposits, although the provincial eco-city is not as important as a national or international one, it is still worth researching.

Figure 1: Location of Shandong Province

Existing literatures relevant to index system of eco-city can be divided into 3 types:
- Summary of the principle of index system and the confirming of indicator values;
- Analysis of some indexes of one eco-city from the aspects of a certain specialized planning;
- Analysis of a certain national or international eco-city’s index system.

This paper elaborates the methods of establishing an index system and steps of determining indicator values with general applicability. To make these theories to be understood easily, the article takes the case of Xiuyuan Eco-city for instance, analyzing methods and steps aforesaid.
General Situations of Xiuyuan Eco-city

Xiuyuan Eco-city is a part of Zhangqiu City which is located in the middle part of Shandong Province. Zhangqiu is the only county-level city of the provincial capital, Jinan City and plays an important role in the development of Shandong Peninsula (Figure 2, Figure 3).

Figure 2: Location of Jinan (Prefecture-level City)

Figure 3: Location of Zhangqiu (County-level City)
As Jinan has always been famous for its springs, through the ages, Zhangqiu City has been developing with the culture of springs. In the past, Zhangqiu’s centre was the former residence of Li Qingzhao (a celebrated female poet in the Northern Song Dynasty) and Baimai Springs (Figure 4) located in the east part of the city. However, in 2011, the Government of Zhangqiu put forward a development framework of One River and Two Zones. This means, in the future, Zhangqiu will develop with a middle shaft, XiuYuan River. The old town with springs in the east and a new town near the urban district of Jinan in the west will be constructed better as well. The area of Xiuyuan Eco-city is 23.75k m², while the starting area, which located on the west side of Xiuyuan River and will be constructed within 2 years, is 3.04k m² (Figure 5, Figure 6). Existing constructions in this area include 6 historic sites, more than 10 natural villages, 1 factory and 2 residential quarters (Figure 7).

Figure 4: Images of Baimai Springs

Figure 5: Location of Xiuyuan Eco-city
Basic Theories of Index System for Eco-city

Significance and Principles of Index System

A city, no matter big or small, is a complex system composed by environment, society and
The development of one city involves numerous disciplines such as resources, energies, politics, cultures, management, ecology, planning, engineering, etc. Making index system for eco-city is in favor of defining the development direction and target of the city. The index system can regulate relevant administrative measures, putting indexes into practice in all respects of planning, land transfer, design, construction, operation and demolition. Thus, responsibilities of every stakeholder will be clear, and the construction management of eco-city will be normalized and institutionalized.

The principles of the compilation of index system are listed as follows:

- Combine comprehensiveness with emphasis;
- Combine integrality with hierarchy;
- Combine scientificity with feasibility;
- Combine generality with specialty.

*Basis of Index System for Xiuyuan Eco-city*

Xiuyuan district had some policy and planning documents before declaring construction an eco-city, which became the basis of the index system.

- Relevant policy documents;
- Regulatory planning: *Landscape Planning of Xiuyuan River, Regulatory Detailed Planning of Xiuyuan CBD*, etc.

*Hierarchy of Index System*

According to system structure, the index system can be classified into target layer, path layer and indicator layer. To make clear responsibilities of different stakeholders and to guarantee the performance of indicators, the index system can also be classified into government layer (G), enterprise layer (E) and public layer (P).

*Classifications of Indicators*

All the classifications of indicators mentioned by Figure 8 can be found easily in the document *Index System of Xiuyuan Eco-city*. However, due to the limited space, this article will only involve some of them.
Establishment of the Index System and Determination of Indicator Values

The index system for Xiuyuan Eco-city was established according to scientific analysis based on local situations and mature index systems for domestic and overseas eco-cities.

Analysis of Existing Index Systems for Other Eco-cities

In 1971, United Nations Educational Scientific and Cultural Organization (UNESCO) put forward a qualitative evaluation standard for ecological city. This standard includes 6 aspects of eco-city construction, involving ecology planning, green industrial product, organic farming, longevity community, cultural heritage and natural resources.

The index system of famous Hammarby Sjöstad in Sweden makes requirements of land usage, transportation, water supply and drainage, building materials, energy, and waste in the layer of operation target. This city’s construction has created the classical Hammarby Mode, which has successfully made a closed ecological cycle in the aspects of energy, waste, water supply and drainage. The ecological residential district - Viikki in Finland formulates 17 indicators involving pollution, natural resources health, biodiversity, and nutrition. In order to rate and evaluate the eco-city, every indicator shows 3 levels of requirements – minimum threshold, 1 point and 2 points.

Sino-Singapore Tianjin Eco-city establishes 26 indicators to prescribe important procedures
of construction and operation, especially the aspects of renewable energy (20%), green building (100%), potable water (100%), recycle of waste (60%) and green trip (90%). Tangshan Bay Eco-city’s index system, which has 141 indicators, is extremely complex. There are 23 indicators only in the part of Architecture and Building Industry. However, through investigations and studies, the authors believes that this index system is too complicated to execute. However, the reference index system made by the Chinese Ministry of Housing and Urban-Rural Development (MOHURD) only includes 4 first grade indexes, 12 second grade indexes and 46 third grade indexes, which separately refers to the target layer, path layer and indicator layer aforesaid. This kind of system is clearer and easier to be understood and to be put into practice. The first grade indexes are Economy Sustainability, Resource Conservation, Environmental Protection, and Society Harmonious. The second grade indexes are Low Carbon Emission, Intensive Land Use, Green Transportation, Green Municipal Administration, Green Building, Green Energy, Solid Resources, Water Resources, Ecological Environment, Living Environment, Public Livelihood, and Efficient Management.

**Establishment of the Index System for Xiuyuan Eco-city**

At the beginning of 2015, the Shandong Provincial Government regulated that to construct an eco-city, the local municipal government should establish an index system with the same first and second grade indexes of the MOHURD’s. Xiuyuan Eco-city’s index system which has 42 third grade indexes and 64 specific indicators was established according to the situation of the area, adding, removing and modifying some of the MOHURD’s indicators (Table 1).

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<td>21</td>
<td>Control rate of natural ventilation and daylighting</td>
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<td>22</td>
<td>Building envelope</td>
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<td>23</td>
<td>Building shading</td>
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<td>24</td>
<td>Utilization rate of roof</td>
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<td>25</td>
<td>Coverage rate of cool roof</td>
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<td>26</td>
<td>Green construction rate</td>
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<td>27</td>
<td>Industrialized building rate</td>
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<td>28</td>
<td>Fully decorated housing rate</td>
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<td>29</td>
<td>Green building materials rate</td>
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<td>30</td>
<td>High tensile reinforcement rate</td>
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<td>31</td>
<td>New and renewable energy rate</td>
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<tr>
<td>32</td>
<td>Installation rate of solar heating system</td>
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<td>33</td>
<td>Shallow geothermal energy</td>
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<td>34</td>
<td>Industrial exhausted heat utilization</td>
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<td>35</td>
<td>Distributed combined cooling heating and power</td>
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<td>36</td>
<td>Classified collection rate of household waste</td>
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<tr>
<td>37</td>
<td>Decontamination rate of household waste</td>
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<tr>
<td>38</td>
<td>Recovery rate of household waste</td>
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<td>39</td>
<td>Recovery rate of construction waste</td>
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<td>40</td>
<td>Comprehensive utilization ratio of industrial solid waste</td>
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<td>41</td>
<td>Volume capture ratio of annual rainfall</td>
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<td>42</td>
<td>Treatment rate of sanitary sewage</td>
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<td>43</td>
<td>Standard discharge rate of industrial sewage</td>
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<td>44</td>
<td>Water-saving equipment and apparatus penetration</td>
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<tr>
<td>45</td>
<td>Utilization rate of nontraditional water source</td>
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<td>46</td>
<td>Native plant indicator</td>
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<tr>
<td>47</td>
<td>Reservation and Recovery rate of original landscape</td>
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<td></td>
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<tr>
<td>48</td>
<td>Cemented shoreline rate</td>
<td></td>
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<td></td>
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<tr>
<td>49</td>
<td>Days of good weather (PM2.5)</td>
<td></td>
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<td></td>
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<tr>
<td>50</td>
<td>Control rate of area surface water quality</td>
<td></td>
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<td></td>
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<tr>
<td>51</td>
<td>Control rate of drinking water</td>
<td></td>
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</tbody>
</table>
Determination of Indicator Values for Xiuyuan Eco-city

The determination of indicator values has the same significance as the establishment of index system structure. Values for Xiuyuan Eco-city strictly obey Shandong provincial government’s requirements of key indicators (Table 2). This paper will take 5 typical indicators of Xiuyuan Eco-city for instance, introducing methods and steps to determine the values.

Table 2: Key Indicators for Xiuyuan Eco-city

<table>
<thead>
<tr>
<th>NO.</th>
<th>Indicator</th>
<th>Constraining characteristic</th>
<th>Unit</th>
<th>Implementation phase</th>
<th>Executor</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Urban construction land area per capita</td>
<td>Controlled</td>
<td>m²/capita</td>
<td>≤100</td>
<td>Design</td>
<td>G ≤100</td>
</tr>
<tr>
<td>8</td>
<td>Road network density</td>
<td>Controlled</td>
<td>km/km²</td>
<td>≥9</td>
<td>Design</td>
<td>G &amp; E ≥8</td>
</tr>
<tr>
<td>9</td>
<td>Green transportation rate</td>
<td>Controlled</td>
<td>%</td>
<td>≥65</td>
<td>Operation</td>
<td>G &amp; E &amp; P ≥65</td>
</tr>
<tr>
<td>15</td>
<td>Water leakage ratio of municipal network</td>
<td>Controlled</td>
<td>%</td>
<td>≤10</td>
<td>Operation</td>
<td>G ≤15</td>
</tr>
<tr>
<td>16</td>
<td>Coverage rate of accessibility facilities</td>
<td>Controlled</td>
<td>%</td>
<td>100</td>
<td>Design</td>
<td>G &amp; E ≥12</td>
</tr>
<tr>
<td>31</td>
<td>New and renewable energy rate</td>
<td>Controlled</td>
<td>%</td>
<td>≥15</td>
<td>Design</td>
<td>G ≥12</td>
</tr>
<tr>
<td>36</td>
<td>Classified collection rate of household waste</td>
<td>Controlled</td>
<td>%</td>
<td>≥90</td>
<td>Operation</td>
<td>G &amp; P 100</td>
</tr>
<tr>
<td>37</td>
<td>Decontamination rate of household waste</td>
<td>Controlled</td>
<td>%</td>
<td>100</td>
<td>Operation</td>
<td>G 100</td>
</tr>
<tr>
<td>39</td>
<td>Recovery rate of construction waste</td>
<td>Controlled</td>
<td>%</td>
<td>≥30</td>
<td>Operation</td>
<td>G &amp; E ≥20</td>
</tr>
<tr>
<td>41</td>
<td>Volume capture ratio of annual rainfall</td>
<td>Controlled</td>
<td>%</td>
<td>≥75</td>
<td>Design</td>
<td>G ≥70</td>
</tr>
<tr>
<td>42</td>
<td>Treatment rate of sanitary sewage</td>
<td>Controlled</td>
<td>%</td>
<td>100</td>
<td>Operation</td>
<td>G 100</td>
</tr>
<tr>
<td>44</td>
<td>Water-saving equipment and apparatus penetration</td>
<td>Controlled</td>
<td>%</td>
<td>100</td>
<td>Operation</td>
<td>G &amp; E 100</td>
</tr>
<tr>
<td>54</td>
<td>Coverage rate of greenlands' service radius</td>
<td>Controlled</td>
<td>%</td>
<td>≥90</td>
<td>Design</td>
<td>G ≥90</td>
</tr>
</tbody>
</table>
Clean Energy Public Transportation Rate is the rate of public vehicles using clean energy (biomass, hybrid power, electric energy, etc.) to all public vehicles. Index system for Sino-Sweden Low Carbon Eco-city in Wuxi (2010~2020) regulates that public vehicles should better use clean energy. The city should purchase and make use of energy-saving and environment-friendly public vehicles using electric energy, hybrid power, novel fuel, etc. Index System for Green Ecological Urban Area in Anhui Province (Trial Version) rules that clean energy public transportation rate should not below 20%. In April 2014, Zhangqiu City bought 30 liquefied natural gas (LNG) buses. This was the first time the county level city imported new energy public vehicles. According to the data in June 2014, there were 117 public buses in Zhangqiu, which means the rate of clean energy public transportation was 25.4% that time. Taking the good condition of clean energy bus in Zhangqiu into consideration, the rate of clean energy public transportation should better be no less than 30% till 2017, and be no less than 50% till 2020.

Fully Decorated Housing Rate is the rate of the construction area of fully decorated housing to that of all housing in the eco-city. A fully decorated residence must have its all fixed surfaces painted, all pipes installed and all basic equipment and apparatus in the kitchens and washrooms installed before delivering to residents. In 2008, MOHURD clearly pointed out that the government would not allow some cities to construct unfurnished housing after 2010. In these cities, 80% of high-rise residences and 50% of normal residences must be fully decorated. However, according to data in 2010, fully decorated housing rate of first-tier cities (e.g. Peking, Shanghai, Guangzhou) in China was 50%~70%; while the rate of second-tier cities (e.g. Shenyang, Qinhuangdao, Changsha) was 10%~15%. Taking the currently poor condition of China and the situation of Zhangqiu, the county-level city, into consideration, Xiuyuan Eco-city should appropriately reduce the value of fully decorated housing rate. The rate should be no less than 25% till 2017, and be no less than 30% till 2020.

New and Renewable Energy Rate is the rate of new energy and renewable energy to primary energy consumption. In 2011, MOF (Chinese Ministry of Finance) and MOHURD released a document and regulated that renewable energy consumption rate in buildings should be more than 10% till 2015, and more than 15% till 2020. In order to make an accurate value, the authors investigated several technical files about this rate (Figure 9). According to
former planning of green energy, this rate was estimated to be 17.12% in 2020. And it is required that the utilization rate of new and renewable energy should be no less than 15% till 2017, and be no less than 17% till 2020.

![Figure 9: Requirements of New and Renewable Energy of Technical Files (Till 2020)](image)

**Cemented Shoreline Rate** is the rate of contour area of cemented shoreline to total area of shoreline. This rate is regulated to be 15%~20% by *Index System for National Garden County Standard, Technical System for Green Ecological Urban Area in Hubei (Trial Version)* as well as *Technical Guideline for Low-energy Green Building Demonstration Area*. In view of the currently good condition of Xiuyuan River’s shoreline (Figure 10), it is required that the cemented shoreline rate should be no more than 15% from 2015.

![Figure 10: Scenery of Xiuyuan River](image)

**Cultural Heritage Protection Rate** is the rate of numbers of cultural heritages under protection to that of all cultural heritages in the eco-city. This rate is required to be 100% by *Technical System for Green Ecological Urban Area in Hubei (Trial Version)* and *Index System for Green Ecological Urban Area in Anhui Province (Trial Version)*. There are all together 6 cultural heritage protection units in Xiuyuan Eco-city (Figure 7). Among them, Ma’an Site, a key cultural relic protection unit of Jinan, is the most famous one. The authors believe that the
construction of eco-city should pay enough respect to history and culture. It is required that the cultural heritage protection rate should be 100% since now on.

Figure 11: Ma’an Site and Its Cultural Treasures

Conclusion

Local government of an eco-city should establish a suitable, reasonable and effective index system based on the city’s location, climate and natural resources, local technologies and materials. This kind of index system, though complex, can be understood and operated easily. Compilation steps of an index system for eco-city are shown by Figure 12. An index system established following these steps will be able to provide useful information to the phases of planning, design, construction, and will lay a good foundation of collaborative management for the eco-city.

Figure 12: Compilation Steps of an Index System for Eco-city
References


Landscape Character and Significance
Affecting Policy

Why landscapes matter in regional Australia

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Paper Presented at the
Australian Regional Development Conference
Albury (NSW), 26 – 28 Aug 2015
Landscape Character and Significance
Affecting Policy

Why landscapes matter in regional Australia

ABSTRACT: This paper focuses on the Landscape Character and Significance work prepared by Planisphere for a large proportion of rural and regional Victoria including the Victorian Coastline and the majority of Western and Northern Victoria, including the many varied landscapes of desert, agricultural plains and rugged uplands. The paper presents a methodology that has been pioneered over many years involving over twenty months of comprehensive research, extensive field survey work and a broad and inclusive consultation program which presents a thorough assessment of landscape character, and areas and views of significance across Victoria. The outputs of these Studies reinforce and enhance the application of State and local planning policy regarding the management and protection of significant landscapes. They will be used by a range of councils and key government agencies to better inform decision making through a more detailed consideration of impacts, opportunities and approaches to achieve improved siting and design outcomes for development within these important landscapes.

Keywords: Landscape assessment, design policy, State planning policy

Introduction

Landscapes are an intrinsic part of our national identity. They are highly valued across the cultures and generations, and integral to the tourism offer of every region. To date, the character and significance of nearly all of Victoria’s rural landscapes have been documented through a series of Landscape Assessment Studies commissioned by State and local governments over the last 12 years. These Studies have set out frameworks for the ongoing management and protection of Victoria’s landscapes, which is an essential first step in ensuring that our landscapes, and all of the values they hold for the community, are maintained into the future. Councils, communities and stakeholders have worked collaboratively to achieve this outcome for Victoria. The Landscape Assessment Studies are based upon a detailed methodology, representing an international best practice approach, and have been implemented (or are in the process of implementation) through State and Local Planning Policy and development controls. In addition to these statutory measures, the Studies aim to engender a broader, more holistic concept of ‘landscape custodianship’, whereby a collective and co-operative approach to long-term management of landscapes as shared community resources is achieved.
Introduction
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Why are landscapes important to regional Australia?
Identity
Landscapes form an integral part of the identity of all countries. Australia is internationally renowned for its stunning and iconic landscapes; our landscapes are unique and instantly recognisable. They are a defining element of our identity as a nation. Our most iconic landscape feature, Uluru, is a national symbol.
At the local or regional level, lesser known landscapes are also important references for local culture and identity.

Value

A high value is placed upon the scenic qualities of landscapes, in addition to other values they may hold. Within Australia we have 19 sites inscribed in UNESCO’s World Heritage List, and 15 of those sites are landscapes.

Our passion for landscapes has been expressed prolifically in art, literature and photography. We are all familiar with the highly evocative impressionist paintings of Streeton, Roberts, McCubbin and others which depict the beauty of our regions. Dorothea Mackellar’s famous poem *My Country*, which speaks of her love for ‘a sunburnt country, a land of sweeping plains’ was inspired by her experiences of life on the land. Written while abroad and feeling homesick, her sentiments still resonate today.

We sing about landscapes in our national anthem – of our land that ‘abounds in natures gifts, of beauty rich and rare’. Our shared love of our landscapes transcends the generations and cultures.

Tourism

Landscapes are an integral part of the regional tourism offer and heavily promoted through visitor information brochures and websites. The scenic quality of many regions forms the backdrop of their visitor experience. For example, the King Valley wine region is famed for its highly picturesque setting of verdant agricultural and viticultural landscapes set at the foothills of the Victorian Alps. Currently, the Rural City of Wangaratta is pursuing statutory protection for the landscape of this region.

What’s been achieved in Victoria?

Over the last 12 years, Landscape Assessment Studies have been completed across numerous regions and municipalities of Victoria. As a result, the landscape character of nearly all of the State has been documented in detail and significant landscape features have been identified, with strategies proposed for their ongoing management and protection.

This includes major regional projects commissioned by the State government who have fortunately, for the people of Victoria, shown foresight and leadership in seeing the value of protecting and managing our landscapes. Municipal Studies have also been commissioned by local government, which highlights the importance of landscapes which are valued by smaller communities but may not receive a great deal of outside attention. These
Studies have pioneered landscape assessment in Australia and have been recognised by various awards from the Planning and Landscape Architecture Institutes.

**Regional Landscape Assessment Projects**

The first major Landscape Assessment Study undertaken for an entire region was the *Great Ocean Road Region Landscape Assessment Study*, commissioned the State government and completed in 2003. This project assessed the landscapes of Victoria’s coastal areas from Torquay in the east through to Warrnambool in the west. With its unique coastal scenery and formations, including the iconic Twelve Apostles, the scale and variety of forests and its vegetation cover and habitat, this region provides one of the State’s most significant natural resources, of immense recreation and tourism value.

![Image 2: Twelve Apostles](image)

This project was followed by Landscape Assessment Studies being commissioned by the State government for large regions across the State. The *Coastal Spaces Landscape Assessment Study* was completed in 2007, and studied the remaining sections of the entire Victorian coastline.

The *Southwest Victoria Landscape Assessment Study* (2013) investigated a region comprising 15 municipalities. Six regional assessments were completed this year (2015) for the western, central and eastern parts of the State (by Planisphere and GHD), taking in the entire Murray River region. Now only the inland Gippsland region of Victoria remains to be completed.
Local Landscape Assessment Projects

Landscape Assessment Studies have also been commissioned by State and local government for municipal areas, allowing local issues to be addressed in more detail. This includes Studies for the Southern Grampians, Baw Baw and Murrindindi Shires, the City of Greater Bendigo and the Rural City of Wangaratta.

In addition, a number of peri-urban Councils around Melbourne have been proactive in protecting their landscapes and managing development issues at the urban-rural interface, in view of the effects of encroaching suburban sprawl upon the landscape values of their rural and green wedge areas.

What are the Council & community responses?

Studies undertaken in Victoria have a track record of effective collaboration among Councils, stakeholders and communities to explore landscape values and test options for management.

Reference groups were established for each project comprising representation of Councils, Aboriginal Affairs Victoria, Heritage Victoria, catchment management authorities, public land managers and community groups. These groups provided invaluable local knowledge and feedback on study findings and recommendations as each project progressed.

Community workshops for local area Studies have been well attended, and have provided the opportunity for in-depth discussion around management issues. This shows the level of importance that people hold for the landscapes of their area.

Each project includes a broad media campaign in the form of printed and online material. Typically, projects commence with a community photographic survey to ask people to share information about the landscapes of their area through words and images. A series of questions is posed to explore themes such as:

- *How would you describe the character of landscapes in your area?*
- *What landscapes are the most significant, scenic or beautiful in your area? Where would you take a visitor?*
- *Are there non-visual values attached to the landscape, such as environmental or historic values?*
- *Do you consider there to be any threats to the landscape?*

The photo surveys provide invaluable local knowledge and inspiration. The quality and diversity of photos received show that people genuinely love their local landscapes and convey immense pride in their region.
Concerns about additional controls on development that may result from the Study findings are also often raised, and the consultation provides the opportunity to explore these with the community, particularly for those who depend upon the productive value of the land for their livelihood.

**How do we do it?**

*Methodology overview*

Our Study methodology to examine landscape character and significance has been progressively developed over the last 12 years, and is based upon international best practice, drawing from similar studies in the United Kingdom.

The methodology sets a framework for a deep exploration of landscape values, through the information sources of community feedback, the findings of other relevant studies and from a comparative visual assessment by the Study team’s site survey.

The Studies adopt a holistic approach that considers all cultural landscape values, including aesthetic values – both visual and non-visual – as well as other values such as historic, environmental and social values. A detailed visual assessment is at the core of the work, however, largely because the Studies are commissioned by State or local government strategic planning departments with the intention of protecting landscapes through planning schemes.

Generally, the methodology is structured around consideration of:

- Landscape character and significance;
- Community values;
- Values identified from other background sources, such as environmental or heritage studies;
- Managing anticipated change in the landscape; and
- Establishing future character directions and a framework for protection and management of landscape character and significance.

The method is illustrated in the following diagram:
The approach
The Studies commence with detailed desktop research and background analysis. An initial understanding of landscape character is drawn from IBRA bioregions, which is layered with GIS mapping of key landscape elements such as topography, waterform, vegetation cover and settlement patterns. We also examine the landscapes referenced in Council planning schemes, tourism websites, National Park notes and documents such as catchment management strategies. This helps to form a basic understanding of the character of the landscape prior to survey, and highlight features of significance to be investigated.

We then ‘hit the road’ for days, sometimes weeks, at a time, surveying in detail all parts of the study area. We climb mountains, traverse vast plains, ford streams and get bogged in the desert. Along the way we take comprehensive notes and thousands of photos.

When out on survey, we draw heavily upon the knowledge of people we meet. First port of call is the Visitor Information Centre, where we gather a great cache of brochures and maps and pick the brains of the always extremely helpful volunteer staff. We ask the local shopkeeper, or the people at the servo when we’re filling up the car or the pub when we’re having dinner, what they love about the landscapes of their area. What are the postcards in the shop telling us to see?

What is landscape character and significance?

Landscape character
Landscape character is defined as the “interplay of geology, topography, vegetation, water bodies and other nature features, combined with the effects of land use and built development, which makes one landscape different from another.”
A study area is divided into ‘landscape character types’ based on broad areas of common physical, environmental and cultural characteristics, taking into account these elements.

The starting point in preparing a Landscape Assessment Study is to understand and document the underlying landscape character of the entire study area, from analysis of these elements. This forms the basis and context for identifying areas of landscape significance. The way in which the landscape has been formed and changed over time is described, threats or management issues are documented, and the viewing experience of the landscape is considered.

From our Landscape Assessment Studies over the last 12 years, we have documented the rich and varied character of Victoria’s landscapes: the vast expanse of the Western Volcanic Plain punctuated by the rises of volcanic cones; the seemingly never-ending agricultural plains of the Wimmera and Mallee with their ‘big skies’ and long horizons; the picturesque undulations of the Uplands that extend across central Victoria; the flat river valleys of northeast Victoria that extend between the forested ridges and peaks of the Northern Fall, which rises up to the Victorian Alps; and the rugged wilderness of our spectacular coastline.

**Landscape significance**

Landscape significance is defined as “the designation of a particular landscape as special or important arising from its aesthetic values (both visual and non-visual) which takes into account aesthetic values historic, environmental, scientific, social or other values”.

Landscapes are significant to different people for different reasons. These reasons may include their scenic beauty, agricultural productivity, historic value, environmental qualities, or less tangible values associated with the place, such as memories or associations. The fact that landscape values are held both by individuals and communities, and that many values exist in the subjective territory of human perceptions is what makes the assessment of landscape significance so challenging and often contentious.

Defining significance is as much about hearing people’s stories about the landscape as it is about academic research, and community feedback is a vital source of information in this process.

For every landscape, a range of factors will combine to create an overall illustration of its value. Our methodology includes a structured assessment of the visual components of each landscape, namely its features, edges or contrasts and composition. Each component is given
a rating value by way of comparative assessment against similar landscapes in the region and the State by considering whether it is ‘iconic, rare or exemplary’.

Through this investigation, a strong evidence base for identifying a landscape as significant is constructed. In some instances, a landscape with many identified values will be considered to have a high level of significance that may warrant a specific approach to its management.

Landscape Assessment Studies have identified places and features of State, regional or local landscape significance across the State. The Victorian Alps or the Grampians (Gariwerd), for example, are identified as being of significance to the State, or potentially the nation. Examples of regionally significant landscapes include Lal Lal Gorge and Mount Warrenheip near Ballarat, or the Warby Ranges near Wangaratta.

**Significant views**

An assessment of significant views is also undertaken as part of each Landscape Assessment Study. Views available from publicly accessible viewing locations are examined in detail and their aesthetic characteristics assessed in terms of their compositional structure and qualities. Other cultural values that a view may have are also noted. A viewshed analysis may also assist in understanding the extent of the landscape visible from the viewing location.

**Other landscape values**

Secondary sources are used to determine other cultural landscape values, such as environmental or heritage values, as opposed to primary research, and this investigation provides supporting evidence for a landscape’s significance.

**Change in the landscape**

Landscapes are formed through change over time. An understanding of ‘landscape morphology’ or how a landscape has evolved is critical to a complete appreciation of landscape character.

Some types of change could be considered detrimental to what the community expect or desire for the future of that landscape e.g. the development of large dwellings atop sensitive dunal landscapes. Other changes contribute to the character of landscape through variations to patterns and colours in natural and agricultural landscapes across seasons. Other changes still, are the physical manifestation of community desire for a different type of landscape e.g. revegetation of a degraded site.

As landscapes are a changing entity, the aim of the Studies is to manage the rate, type and scale of landscape change. Anticipating future changes to a landscape and understanding
how the landscape might be affected by those changes is an integral aspect of establishing a management framework for the future.

**What are the results on the ground?**

Each Study includes a management framework that recommends statutory measures to be implemented through the planning scheme, as well as a suite of other measures that embrace a broader concept of ‘custodianship’ of the landscape.

Managing development in the landscape is generally the primary aim. Development issues and threats that are commonly seen include ribbon development at settlement edges, built form that dominates its landscape setting, removal of vegetation or earthworks that are highly visible. Concerns frequently raised about the siting and design of development include buildings on ridges, hilltops or escarpments, the use of bright or highly reflective materials, buildings of a large, overbearing scale, buildings which block significant views and high, solid fencing. Design guidelines are prepared to provide direction on positive design outcomes within the specific landscape context.

At a Statewide level, changes to State Planning Policy have been implemented to provide overarching strategic direction for management of landscapes and protection of landscape values, which applies to all landscapes across Victoria. At the municipal level, local Planning Policy to protect landscapes has been implemented in a number of municipalities across the State, to implement the findings of local area assessments.

The Significant Landscape Overlay has been applied to numerous landscape areas and features of identified significance, to provide a higher level of protection for these sites. The overlays include tailored objectives and guidelines for new development to manage the issues and threats specific to each place.

Consideration of landscape values has been an integral aspect of regional planning initiatives completed across Victoria, with all of the recently completed Regional Growth Plans documenting the importance of landscape values. The regional Landscape Assessment Studies will provide invaluable input to future settlement planning, supporting regional tourism and protecting cultural and environmental assets. The Studies will also provide context about landscape values for other strategic planning projects, such as tourism strategies, growth planning, rural land use strategies and visual impact assessments.

Many landscape and visual impact assessments undertaken are small scale and initiated to respond to particular development issues. A comprehensive landscape assessment of a region or municipality allows State or local government planners to consider the broad
range of community values about landscapes in their decision making process. This offers a greater level of certainty for both the community and development industry.

In addition to these outcomes, the Studies aim to engender a broader, more holistic concept of ‘landscape custodianship’, whereby a collective and co-operative approach to long-term management of landscapes as shared community resources is achieved. Other initiatives outside of the planning system that can assist in managing landscapes might include:

- Actively fostering ongoing dialogue about land management between stakeholders such as Council, community, agencies, Registered Aboriginal Parties and service providers.
- Promotion of the benefits of landscapes (social, recreational, economic etc.) and community education about the importance of effective management of landscapes.
- Financial incentives for residents to manage landscapes, such as rate rebates for weed removal.
- Using the Studies as a reference for public land management strategies.

Conclusion
The landscape character and significance of nearly all of Victoria’s rural areas has been documented through extensive Landscape Assessment Studies completed over the last 12 years. Protection of these landscapes has been implemented (or is in the process thereof) through Statewide policy and amendments to a number of local planning schemes.

The methodology of these Studies includes a comprehensive consideration of landscape values, drawing from community feedback, detailed comparative analysis and review of background sources. A holistic picture of landscape values held by each community is achieved in the process, and a framework for ongoing management of landscapes into the future is established. Importantly, the sense of ‘landscape custodianship’ is engendered, encouraging all people who value our unique natural landscapes to play a part in ensuring that these resources can continue to be enjoyed for generations to come.
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Government/NGO/Other Publications


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Low Carbon West:
A regional strategy to reduce carbon emissions

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Paper Presented at the
Australian Regional Development Conference
Albury (NSW), 26 – 28 Aug 2015
ABSTRACT: Councils are taking responsibility to reduce carbon emissions - leading the way by reducing their own emissions and assisting community action. But to transform a whole region to a low carbon economy, councils need to do more. They can collaborate on large-scale projects across municipalities, create opportunities for businesses from sustainable, low-carbon growth, and coordinate programs to increase their reach to communities, strengthen their messages and improve liveability.

The Western Alliance for Greenhouse Action (WAGA) is a partnership of eight councils in the west of Melbourne, representing a cross-section from urban (Maribyrnong), to growth (Wyndham) and rural (Moorabool). Jointly with LeadWest (an initiative of local government and regional businesses) and Regional Development Australia Western Melbourne, WAGA has developed a regional greenhouse strategy, ‘Low Carbon West’. Its purpose is to make a step change across this diverse region towards a growing low carbon economy.

In 2015, the project's partners will undertake the following priorities in accordance with the strategy:

- Implement a program to reduce business premises emissions, including consideration of how best to engage with and assist small and medium-sized enterprises
- Explore potential for utility-scale renewable energy plants in the region
- Review best-practice programs to reduce residential buildings emissions, and consider a pilot program for the region
- Advocate to the Victorian Government to reduce transport emissions across the state by developing an interstate freight terminal.

Low Carbon West, with its focus on the business sector and its regional approach, provides insights and learnings for a range of organisations to contribute to sustainable, low-carbon economic growth across regional Australia.

Keywords: Low carbon growth, Carbon emissions, Regional strategy, Local government alliance, Low carbon economy

Introduction

Low Carbon West is a transitional strategy for the western Melbourne region encompassed by the municipalities in the Western Alliance for Greenhouse Action (WAGA) to support the growth of this vibrant and diverse region while limiting the increase in greenhouse gas emissions associated with that growth.

The WAGA region is the fastest growing in Australia, and its councils and stakeholders are in a great position to demonstrate national leadership in responding to the threat of climate
change. The region represents a cross-section of councils ranging from urban (Maribyrnong), to growth (Wyndham) and rural (Moorabool). There is an opportunity to collaborate on large-scale projects across municipalities, create opportunities for businesses from sustainable, low-carbon growth, and coordinate programs to increase their reach to communities, strengthen their messages and improve liveability.

Low Carbon West has been developed by WAGA, with project partners LeadWest and Regional Development Australia Western Melbourne. AECOM and Arup were jointly commissioned as the project consultants and led the consultation, analysis and strategy development. The strategy’s vision for the WAGA region is that:

“Melbourne’s West will support a growing, vibrant and diverse economy and will achieve this whilst minimising the increase in greenhouse gas emissions associated with the region’s growth.”

This strategy fulfils the need for action by local government at a regional level and provides the framework for this action to be implemented to reduce greenhouse gas emissions.

The value of a regional approach by local government in response to common needs and requirements is increasingly recognised and mirrors the regional outlook of WAGA and co-funders LeadWest and RDA Western Melbourne.

In this case, the regional approach can:

- Produce a comprehensive strategic blueprint to guide action to reduce emissions across all sectors in the region
- Enable greater momentum to be generated for productive political, social and cultural change in the region that will underpin sustainable economic development
- Identify opportunities where collaboration would augment outcomes; for instance, in advocating for policy as a region
- Initiate and foster projects that are only feasible on a regional scale
- Leverage individual stakeholders’ experience, expertise and relationships to maximise reach and effectiveness in planning and communicating with local businesses and communities
- Make the most efficient use of individual councils’ and other stakeholders’ resources
- Take advantage of economies of scale involved in combined action to maximise cost-effectiveness
- Catalyse and support action by other stakeholders in the region.

The Region’s Emissions

The development of Low Carbon West is underpinned by an understanding of the current greenhouse gas profile of the WAGA region and the projection of these emissions to 2020. The emissions data was compiled from numerous sources, including utilities data from
CitiPower, Jemena and SP AusNet, the Victorian Integrated Transport Model, the National Greenhouse Inventory Total, Sustainability Victoria and the Australian Bureau of Statistics. The emissions were distributed across the WAGA councils using factors such as population, local jobs and industrial floor area. Similarly, emissions were projected out to 2020 using a range of factors, including change in population, local jobs, industrial jobs, number of dwellings and agricultural jobs.

In compiling the baseline emissions profile for the WAGA region, the scope of emissions has largely been restricted to the geographical boundaries of the region (i.e. the boundaries of each local government area as part of WAGA).

The baseline emissions for the WAGA region are categorised based on the relevant end use sectors. These sectors are briefly described as follows:

- Residential buildings: accounts for all residential homes, units and apartments within the WAGA region, considering electricity and gas consumption.
- Non-residential buildings: accounts for all non-residential facilities (e.g. commercial office space, warehouses, manufacturing facilities, schools, etc.) within the WAGA region, considering electricity and gas consumption.
- Residential transport: accounts for any non-freight transport within the geographical boundaries of WAGA – including journeys to and from work, and other travel by private vehicle or public transport.
- Freight: accounts for any road freight transport within the geographical boundaries of WAGA – this covers only heavy vehicles on the road.
- Industrial processes: accounts for industrial facilities within the WAGA region that may emit direct emissions into the atmosphere as a result of their processes and activities.
- Municipal waste: accounts for the waste generated by the general population (including small commercial sources) – this attributes the methane emissions generated from landfills (including those outside the WAGA geographical boundary) to waste generation.
- Commercial and industrial waste: accounts for the waste generated from commercial and industrial activities – this attributes the methane emissions generated from landfills (including those outside the WAGA geographical boundary) to waste generation.
- Agriculture: accounts for the direct emissions of methane and nitrous oxide from agricultural activities within the WAGA region.

Figure 1 shows the emissions for the WAGA region per sector by local government area for 2012 and 2020. In terms of total emissions, the WAGA region produced 17.4 million tonnes of carbon dioxide equivalents (tCO\(_2\)-e) of GHG emissions in 2012. Under a business as usual scenario, this is projected to increase to 20.1 million tCO\(_2\)-e by 2020, representing a regional growth of approximately 15%.

Figure 1: Emissions for the WAGA region broken down by LGA and end use sector, 2012 and 2020
Figure 2 shows the emissions profile for the WAGA region for 2012 and 2020, by end use sector. It highlights that non-residential buildings contribute the largest proportion of emissions (46% of the region’s 2012 emissions). This is followed by residential buildings (18%) and residential transport (17%). The waste and agriculture sectors only contribute a combined 4% of the region’s 2012 emissions. The sectors that are predicted to experience the highest growth in emissions by 2020 are municipal waste (21%), residential transport (20%) and residential buildings (20%). Emissions from industrial processes are anticipated to decrease by 4%.

In relation to trends influencing the growth of emissions, there is currently a structural change occurring within the WAGA region and this is expected to continue over the next decade. The change is driven by rapid population growth and land development for new industrial and commercial precincts. For example, the City of Wyndham is predicted to experience the highest proportional growth out of all the local government areas in the region, with an emissions increase of 35% by 2020. This growth is associated with significant job (31% increase) and population increases (45% increase).

Coupled with this are a number of existing industrial and commercial developments that will experience future growth, such as Essendon Fields, Airport West, East Werribee Employment Precinct, the western industrial precinct, and Living Brooklyn in Brimbank. These
developments will lead to rapid population growth, changing demographics, new housing and transport choices and a changing mix of employment, as major industrial employers and emitters wind down their operations (e.g. Toyota, Hobsons Bay). The gradual departure of major industrial employers from the WAGA region is the other major structural change that will influence the WAGA region’s emissions profile and growth over the coming years.

Many, but not all, of these changes are already reflected in the local government projections for population and employment and as such are incorporated into the emissions projections for 2020. However, it is also recognised that while these developments can be foreshadowed, the exact nature of development that occurs on the ground and its performance may vary and this will in turn influence the exact level of emissions that occur in the WAGA region.

Sectors for Action

A clear need for action is evident at all levels of government to reduce greenhouse gas emissions through the legislative, advocacy, programmatic and leadership levers at their disposal. Low Carbon West defines the means through which the WAGA councils are able to provide their regional contribution to the challenge of emission reductions.

The strategy consists of an overarching report that synthesises the analysis of four sectors; business and industry, urban growth and development, transporting people and freight, and communities. Within these four sectors are 20 actions to be undertaken by the region to assist the transition into a low carbon economy.

Business and Industry

The WAGA region has a strong manufacturing, logistics and supply chain, freight and distribution base, and will continue to play a vital role in meeting Victoria’s industrial and logistics needs. The region is also home to a diverse, knowledge-driven economy, based on the production, distribution and use of knowledge and information.

Total emissions attributed to business and industry (2012) in the WAGA region has been estimated at around 11,100 ktCO₂-e, or 64% of the region’s overall emissions. A large amount of these emissions come from non-residential buildings and more specifically from manufacturing, warehouse, distribution and storage.

In developing the strategy, the ten actions in Table 1 were identified for business and industry and can be coordinated through three programs:
1. Reducing business premises emissions
2. Reducing freight emissions
3. Stand-alone energy generation

Table 1: Actions in the Business and Industry sector

<table>
<thead>
<tr>
<th>Business and Industry action descriptions</th>
<th>Emissions benefit (ktCO₂-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create bulk-buy schemes for solar PV panels to be installed in non-residential buildings</td>
<td>853</td>
</tr>
<tr>
<td>Establish a program for smaller industrial energy users to report on energy use and develop resource efficiency plans, and work with large industry energy users to sign up to voluntary agreements for emissions reductions</td>
<td>813</td>
</tr>
<tr>
<td>Facilitate EUAs for renewable and energy efficient plant (for non-residential buildings or facilities)</td>
<td>215</td>
</tr>
<tr>
<td>Advocate for Large-scale Renewable Energy Generation in WAGA region (large-scale solar)</td>
<td>257</td>
</tr>
<tr>
<td>Fund and facilitate industry training for energy efficiency or building tune-ups</td>
<td>61.3</td>
</tr>
<tr>
<td>Conduct mapping of demand for heating and cooling to identify priority areas for low carbon district heating. The heat map will be an enabler for investment in low carbon district generation</td>
<td>76.4</td>
</tr>
<tr>
<td>Establish a regional network of freight businesses and implement a voluntary program for freight companies to track and reduce emissions</td>
<td>172</td>
</tr>
<tr>
<td>Implement a ‘Cool Roofs’ program</td>
<td>31.8</td>
</tr>
<tr>
<td>Establish a waste-to-energy facility in the region</td>
<td>64.2</td>
</tr>
<tr>
<td>Advocate for establishing a freight consolidation centre in the region, specifically the Western Interstate Freight Terminal (WIFT)</td>
<td>-1130*</td>
</tr>
</tbody>
</table>

* Note that the WIFT would deliver an environmental benefit at a Victorian and national level but will increase emissions within the WAGA region

Communities

The communities sector focuses on actions that reduce emissions in existing residential buildings, residential transport and in municipal waste.

Currently there are around 382,000 dwellings in the WAGA region, most of these being standalone detached houses. Many existing homes do not operate at the same energy performance as new buildings (6-star NatHERS standard), and inefficient homes often lead to higher costs of living through high household energy bills. There is a significant opportunity to reduce the cost of living through energy retrofits for residential housing.
Residents within the region are also highly car-dependent. There is an opportunity to reduce these pressures by supporting alternative forms of transport that are not only less costly for the resident but also reduce emissions. This may be achieved by enabling the use of public transport, or by reducing the emissions from cars through sharing services or carpooling.

The actions listed in Table 2 can be coordinated through the following three programs:

1. Supporting building retrofits and installations
2. Providing education for waste diversion from landfill
3. Equipping drivers with information to make sustainable choices

<table>
<thead>
<tr>
<th>Communities action descriptions</th>
<th>Emissions benefit (ktCO$_2$-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote sustainability measures to the community through the Urban Sustainability Atlas, to identify opportunities for solar PV installations at a proposed location</td>
<td>12.6</td>
</tr>
<tr>
<td>Work with real estate agents to make properties more sustainable through retrofits</td>
<td>7.7</td>
</tr>
<tr>
<td>Create bulk-buy schemes for energy efficient and renewable technology, such as PV, solar hot water and efficient lighting to reduce the capital cost for individual consumers</td>
<td>8.3</td>
</tr>
<tr>
<td>Implement a car-share program, with the potential for either electric or fuel-efficient vehicles</td>
<td>16.7</td>
</tr>
<tr>
<td>Run recycling promotion and education programs, to consolidate and build upon current programs</td>
<td>38.4</td>
</tr>
<tr>
<td>Implement organic waste diversion and compost distribution back to households</td>
<td>27.3</td>
</tr>
<tr>
<td>Implement a carpool matching program for residents, either online or via development of an app</td>
<td>10.0</td>
</tr>
<tr>
<td>Implement a ‘Cool Roofs’ program</td>
<td>31.8</td>
</tr>
</tbody>
</table>

Table 2: Actions in the Communities sector

Transporting People and Freight

Due to an abundance of land, the WAGA region is a strategically suitable location for uses that are land-hungry such as airports (Tullamarine, Essendon and Avalon), ports (Port of Melbourne), rail terminals and freight and logistics warehousing and distribution centres.

It is clear that the WAGA region is an important hub for freight and logistics, with around half of the overall transport emissions for the region coming from freight.
As shown below, the total emissions attributed to transporting people and freight (2012) in the WAGA region is estimated to be around 4,490 ktCO$_2$-e, or 26% of the region’s overall emissions. This sector focuses on reducing emissions in the areas of residential transport and freight.

Low Carbon West sets four main actions in the transporting people and freight sector, listed in Table 3, to reduce GHG emissions. These actions can be coordinated through the following two programs:

1. Tackling residential transport emissions
2. Tackling freight emissions

Table 3: Actions in the Transporting People and Freight sector

<table>
<thead>
<tr>
<th>Transporting People and Freight action descriptions</th>
<th>Emissions benefit (ktCO$_2$-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish a regional network of freight businesses and implement a voluntary program for freight companies to track and reduce emissions</td>
<td>172</td>
</tr>
<tr>
<td>Establish (or extend) a formal car-share scheme in the region</td>
<td>16.7</td>
</tr>
<tr>
<td>Implement a carpool matching program for residents, either online or via development of an app</td>
<td>10.0</td>
</tr>
<tr>
<td>Advocate for establishing a freight consolidation centre in the region, specifically the Western Interstate Freight Terminal (WIFT)</td>
<td>-1130*</td>
</tr>
</tbody>
</table>

* Note that the WIFT would deliver an environmental benefit at a Victorian and national level but will increase emissions within the WAGA region

*Urban Growth and Development*

The changes in land use and the efficiency of new built form will fundamentally affect the WAGA region's transition to a low carbon economy.

The WAGA region is experiencing rapid growth in residential population and dwellings, with up to 180,000 new homes required by 2031. As shown in the figure below, a number of suburbs in the WAGA region are amongst the fastest growing suburbs in the nation. Over this period, emissions from the residential sector are expected to increase by around 1,200 ktCO$_2$-e.

In terms of emissions, the urban growth and development sector makes up around 65% of total emissions in 2012 and 2020, and these are expected to increase by 1,800 ktCO$_2$-e. As
the WAGA region will experience tremendous growth between 2012 and 2020, building energy standards are a key lever for this strategy.

The actions in Table 4 can be coordinated through the following programs:

1. Implementing planning conditions and incentives
2. Supporting building integrated actions
3. Enhancing waste diversion programs

Table 4: Actions in the Urban Growth and Development sector

<table>
<thead>
<tr>
<th>Urban Growth and Development action descriptions</th>
<th>Emissions benefit (ktCO$_2$-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create bulk-buy schemes for solar PV panels to be installed in new non-residential buildings</td>
<td>853</td>
</tr>
<tr>
<td>Promote sustainability measures to the community through the Urban Sustainability Atlas, particularly for new buildings to identify opportunities for solar PV installations</td>
<td>12.6</td>
</tr>
<tr>
<td>Implement planning scheme requirements for high performance buildings / Advocate for reforms to improve national building standards (such as the National Construction Code)</td>
<td>41.3</td>
</tr>
<tr>
<td>Run recycling promotion and education programs, to consolidate and build upon current programs</td>
<td>38.4</td>
</tr>
<tr>
<td>Implement organic waste diversion and compost distribution back to households</td>
<td>27.3</td>
</tr>
<tr>
<td>Implement a ‘Cool Roofs’ program</td>
<td>31.8</td>
</tr>
<tr>
<td>Provide planning benefits or incentives for high performance building applicants</td>
<td>1.7</td>
</tr>
<tr>
<td>Implement planning scheme requirements for high performance buildings, and advocate for reforms to improve national building standards</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Emissions Reductions

Low Carbon West provides a comprehensive suite of actions for limiting the growth of greenhouse gas emissions across the WAGA region to 2020.

The 20 proposed actions (excluding the freight consolidation centre) are projected to result in an emissions benefit of approximately 2,700 ktCO$_2$-e per annum by 2020. This equates to an actual decrease in emissions of approximately 2.5% by 2020, compared to the 2012 baseline
This reduction is achieved as the population and number of dwellings in the WAGA region increase by approximately 20% by 2020.

Figure 3: Actions emissions summary for the WAGA region
A Plan for Implementation

While WAGA has primary responsibility for Low Carbon West, its implementation will require input and action from all member councils with the support of its project partners.

Low Carbon West provides the foundation material to start the necessary conversations with those who have the ability to enact required change to achieve the emission reductions detailed in the strategy. Therefore, resources must be allocated to review the implementation process and to ensure that lessons are learnt regarding the successful implementation of initiatives. An adequately resourced and secure platform is crucial to the success of the strategy.

The actions and programs will to be supported by the following principles:

- Prototyping and market testing: If the actions are not what the community or the market require, then they will not be successful. Extensive consultation with the key stakeholders, in conjunction with prototyping and pilot programs, should be enacted to ensure that the actions will achieve the desired response and success. This should be an iterative process, with a closed loop of feedback.

- Avoiding duplication: Before any particular action is enacted, consultation and research should be undertaken to have a full appreciation of any potential duplication or similarities with other local or regional initiatives. The identification of overlap could reduce the costs and resources.

- Communications and consultation: From engaging with businesses, industry and government, to the local community and environment groups, communications and consultation is necessary to create buy in and propagate the initiatives contained within Low Carbon West.

- Measuring success: A monitoring plan will be developed by sector, with key performance indicators (KPIs) based on the framework for prioritisation of actions within Low Carbon West.

WAGA looks forward to working with industry, council and community to implement this strategy to support growth in the region, whilst limiting the increase of greenhouse gas missions.
Progress So Far

The strategy was officially endorsed by most of WAGA’s member councils in late 2014 and was launched in November. Accordingly, in 2015, the project moves from strategy development to implementation.

The project partners have decided to undertake the following priorities to commence implementing Low Carbon West:

- A program to reduce business premises emissions, particularly working on how best to engage with and assist small and medium-sized enterprises
- Exploration and information-sharing about the potential for utility-scale renewable energy plants in the region
- Consideration of a best-practice pilot program across councils to reduce residential buildings emissions
- Advocacy to the Victorian Government to reduce transport emissions across the state by developing the WIFT.

In developing these actions, WAGA aims to work closely with its stakeholders in industry, the community, government and the university sector. A plan for a program to reduce business premises emissions recognises that most of the region’s emissions are generated by non-residential buildings, so this is where action should start; this plan is due to be completed by the end of 2015. Exploration of large-scale renewables and consideration of best-practice residential programs has already commenced. Advocacy for the WIFT will be led by the Western Transport Alliance, a partnership of most WAGA councils together with other transport and industry stakeholders, and LeadWest, with WAGA contributing arguments in relation to the greenhouse gas emissions benefits of freight consolidation in the west.

In addition, the task for 2015 is to communicate the potential benefits of the strategy to stakeholders across the region, particularly those who are only just beginning to see the links between reducing emissions and economic development. Low Carbon West has the potential to drive significant investment in energy efficiency, renewable energy, upgrades of buildings and facilities, clean tech businesses and related community programs. As such, it also has the potential to maintain and create local clean green jobs and upskilling of local providers in these areas, primarily in small and medium-sized enterprises. Ultimately, Low Carbon West is a way to position the western region of Melbourne as a national centre for a low carbon
economy, under the leadership of local government. That is the message now being communicated by the project partners.
Bibliography


A GIS analysis of land-change effects on storm-induced floods

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Paper Presented at the
Australian Regional Development Conference
Albury (NSW), 26 – 28 Aug 2015
A GIS analysis of land-change effects on storm-induced floods

**ABSTRACT:** Flood inundation is the most expensive natural hazard in Australia because of an estimated annual cost of more than AUS$377 million. Nowadays, urban impervious ground surfaces have been sharply increased owing to booming construction activities. This land-use change inevitably causes more frequent flooding in urban flood-prone areas. For example, a severe thunderstorm drenched Geelong in 2014 and caused the ponding water of waist height on main urban streets. Thus the flood inundation issue associated with urban development needs to be explored and developed. However, little research focused on examining and analysing land-change effects on urban floods induced by storms. This research aims to evaluate impacts on flash floods generated by land-use changes through a constructed framework. Geelong Waurn Ponds campus of Deakin University is then selected as a community-based study case because of much change of topographical features over the last decade. Storms are designed according to different temporal distributions. To evaluate the spatial variation of rainfall-runoff volumes, the hydrological process employs a catchment mesh. GIS technologies are then used to evaluate flooding regions and extents with land uses and storms change. The result demonstrates that the flooding estimation model proposed in this paper is capable of estimating flash floods for different phases of regional development. Hence, it is recommended that the research can be applied to flooding assessment measures for urban development, and attained results can be utilised in governmental planning to raise awareness of flood hazard impacts.

**Keywords:** Land use; GIS; Flash flood; Urban development; Infrastructure construction
1. Introduction
Rapid urbanisation has led to an increase in economic and social wealth in many regions, but an unwanted side effect of this process is more frequent flood inundation in flood-prone areas. Urban flooding has been a severe problem for many cities around the world (Jha et al., 2012). It ranges from minor incidents to major ones, where flooding cities can cause economic damages and loss of human lives (Mark et al., 2004).

In Australia, flooding events over the last four decades have resulted in personal injuries and deaths, and have cost the economy hundreds of millions. For instance, in January 1974, the floods following cyclone Wanda in Brisbane resulted in 16 deaths and 300 injuries, made 9,000 people homeless and cost approximately AU$700 million loss (SCARM, 2000). By 29 January, 900mm rainfall was recorded within Brisbane area, with 314mm daily rainfall (Carbone and Hanson, 2013). In addition, a state-wide flood affected more than 200,000 people in Australian Queensland from December 2010 to January 2011, leading to $2.38 billion economic damage. Beginning with rains in September and then culminating with Category 1 Cyclone Tasha crossing the Far North Queensland coast on 24 December 2011, this was probably the most notorious flood in Australian history (Carbone and Hanson, 2013). Moreover, a severe thunderstorm that drenched Victoria’s second largest city, Geelong, on 19 February 2014 was recorded with 54mm of rain in an hour at Geelong Racecourse. The ponding water rose to waist height in low-lying areas due to blocked drains caused by the storm-induced flood inundation (Mills, 2014). Flood inundation has been seen as the most expensive natural hazard in Australia because of an estimated annual cost of more than AU$377 million (Middelmann, 2009).

Therefore, urban flooding and inundation issues have been drawn increased attention in recent years. Although flood inundation could result from extreme tides, tsunami, snow melt and so on, the Australian Government Bureau of Meteorology (BOM) categorise flooding into riverine floods and flash floods as most flooding events are induced by heavy rains (BOM, 2013). Of the two, flash flooding results from relatively short, intense bursts of rainfall, often from severe thunderstorms, and urban drainage networks do not have the capacity to convey the excess rainwater.

2. Models and Influential Factors of Urban Flash Floods
Flash floods are actually predictable in terms of ponding regions and extents. This means that modelling and measuring urban flood inundation should be explored and developed to reduce flooding damage during periods of urban planning and development. Previous research has
paid extensive attention to this kind of storm-induced flooding and presented several feasible methods in recent years. Among previous paradigms, Leandro et al. (1993) compared two common flooding models, namely a 1D sewer model coupled with a 1D surface network and a 1D sewer model coupled with 2D surface flow. The authors indicated that the 1D/1D model could provide a satisfactory approximation with low computational cost. The other approach can effectively model complex overland flow according to real urban terrain. Before that, Hsu et al. (1980) employed an urban inundation model through combining the Storm Water Management Model (SWMM) and a 2D diffusive overland-flow model, simulating flood inundation as a result of the surcharge of rainstorm from urban drainage systems. Mark et al. (2004) took advantage of 1D hydrodynamic modelling to simulate urban flooding and proposed GIS-based flood inundation maps. However, the 1D model was insufficient to compute flow paths over complex surfaces with dense buildings and infrastructure. In 2009, Dongquan et al. (2009) adopted the SWMM model for an experimental catchment in Macau. In order to delineate catchments and compute key parameters, the authors proposed an automatic batch process with a highly efficient model construction. In 2011, Dawod et al. (2011) developed a GIS-based approach integrating topographic and land-use datasets to investigate the effects on flash floods from catchment areas and basin stream length in Makkah metropolitan areas. For the flood inundation problem, Quan (2014) presented rainstorm waterlogging risk assessment in central urban areas of Shanghai, and proposed the ponding distribution and water depth simulation through a simplified urban waterlogging model combining the SCS model and GIS spatial analysis.

There are several significant factors influencing urban storm-induced floods like urban terrains and drainage capabilities. For examples, depressions are more prone to flash flooding (Youssef et al., 2011). Enlarging capacities of urban sewer systems are beneficial to prevent flood damage (Yen and Chow, 1980). In addition, land use planning is recognised as one of the best means of reducing future flooding risks. This is because flash flooding is closely related to land management strategies and urban infrastructure construction. It is possible that rapid urbanisation increases disaster risks and resultant damage as booming infrastructure construction has resulted in the increase in impervious areas of urban ground surfaces and rainstorm runoff volumes. Urban areas are more likely to be flooded than surrounding areas that are not urbanised due to the increase in overland flow rates (National Oceanic and Atmospheric Administration, 2010). That means that flood risks to life, property and community infrastructure can be minimised and the built environment can be significantly protected through careful urban planning.
However, little research has explored the flood inundation issue based on the land-use change with a real time series. With the rapid development of urbanised regions, soil features have frequently changed over past years. The lack of this type of research does not benefit in examining disaster risk over construction periods for a given region. This study aims to examine impacts on flash floods on the basis of a dynamic analysis considering building and infrastructure construction. To more accurately reflect the spatial variation caused by construction activities, the approach constructs a rain-runoff model based on each catchment unit. GIS technologies are then used to evaluate the effects on flooding extents from land-uses change and different rainfall events.

3. Study Area and Its Topographical Features
In order to examine the effects on flash floods from urban development, this research considers the Geelong Waurn Ponds (WP) Campus of Deakin University as a study area. As shown in Figure 1, the WP campus is situated at the south of City of Greater Geelong, and this study area covers an area of around 1.14 km². In order to describe terrain surfaces of this study area, the background of the WP campus map displays the high resolution digital elevation model (DEM) raster with 2m×2m cell size. This DEM aims to estimate flooding status on the ground surfaces as it could provide sufficient information to describe the continuously varying topographic surfaces. In this study, the DEM file is produced by ArcGIS based on dense spot elevations and revised according to real topographic features like buildings and roads.

Figure 1: Location of study area and topographical features in 2015
In addition, the WP campus provides various community facilities including libraries, student accommodation and sporting fields. In order to analyse the construction-induced impacts on inundation risks, the current infrastructure layout and land uses in January 2015 (Jan15) have also been presented in Figure 1. Land uses are grouped into 8 land types as shown in the legend. The previous infrastructure layout and land uses in July 2004 (Jul04) are exhibited in Figure 2 to compare the campus development. Due to much change of topographical features over the last decade, this area is able to represent a typical study case for examining the impacts on flood inundation from regional land-use changes.

Figure 2: Catchment mesh and topographical features of WP campus in 2004
4. Method and Application to Measuring Land-use Effects

According to the water balance theory formulated as Equation (1), the amount of surface runoff ($Q_r$) can be expressed using the total precipitation volume ($Q_p$), the amount of infiltration ($Q_f$), the amount of evaporation ($Q_e$), and the amount of drainage water ($Q_d$). For a single storm event, evaporation can be negligible because of the tiny amount in a short event.

$$Q_r = Q_p - Q_f - Q_e - Q_d$$  \hspace{1cm} (1)

The nearest rain station to the WP campus recorded that two of highest daily rainfall were 100mm on 27 January 2005 and 98.8mm on 3 February 2005 between 1983 and 2011. Similar precipitation volumes can be designed in terms of rainfall intensities and duration. Rainfall intensity $I$ indicates the ratio of the total amount of the rain falling during a given period to the duration of the period, expressed in depth units per unit time. Rainfall intensities can also be estimated using the Australian Polynomial Algorithmic Intensity-Duration-Frequency equation with polynomial coefficients provided by BOM

$$I = \exp\{A + B(Ln(T)) + C(Ln(T))^2 + D(Ln(T))^3 + E(Ln(T))^4 + F(Ln(T))^5 + G(Ln(T))^6\}$$  \hspace{1cm} (2)

In Equation (2), $T$ is the rainfall duration. The corresponding polynomial coefficients $A, B, C, D, E, F$ and $G$ are respectively set as 3.62, -6.70E-1, -3.53E-2, 6.41E-3, 1.47E-3, 1.38E-4 and -1.01E-4 according to the longitude and latitude of the WP campus and rain return.
period. The Alternating Block method (Chow et al., 1988) can be then employed to generate a rain event, Rain A, by specifying the temporal distribution of precipitation once rainfall intensities are identified. As shown in Figure 3, the total rain depth is 100.26mm, which is close to the highest daily rainfall. However, the temporal distribution varies according to different rainfall events. Thus, a common temporal distribution, which is similar to Type I of Huff Distribution (Huff, 1967), is also proposed as the scenario, Rain H. These hypothetical precipitations have peak rainfall intensities of 22.06 mm/h and 37.34 mm/h respectively. All total rain depths are set as 100.26mm. Moreover, the rainfall loads are uniformly distributed on the study area as the campus is not vast enough to take into account the spatial variation of rainfall.

For given land uses and soil types, the Soil Conservation Service curve number (SCS-CN) approach can be used to measure the amount that rainstorm infiltrates the ground and the amount that rainstorm produces runoff during a single storm event. The SCS-CN approach proposed by U.S. Conservation (U.S. Soil Conservation Service, 1986) has been widely applied to hydrology and environment in the world (Nagarajan and Poongothai, 2012, Zhang and Pan, 2014, Mishra and Singh, 2003, Ranjan et al., 2009). A fundamental assumption is that the ratio of direct runoff to effective rainfall equals the ratio of actual infiltration to potential maximum
soil moisture retention $S$. The other one is that the initial abstraction is the same as the product of the initial abstraction coefficient $\lambda$ and the potential maximum retention (Soulis et al., 2009). Thus, the 1D runoff $R$ in depth can be expressed as

$$R = \frac{(P - \lambda \cdot S)^2}{[P + (1 - \lambda) \cdot S]}$$

(3)

$R$ will be equal to zero if precipitation $P$ in depth is less than 0.2$S$. In addition, $\lambda$ is set as 0.05 (Woodward et al., 2003) and $S$ is equal to 25400/CN-254 with Curve Number (CN) values varying from 0 to 100. In this research, the CN value of raw land is set as 80, building land as 98, Carpark as 98, road as 98, path as 92, water body as 100, grassland as 75 and sports court as 90 based on the TR-55 manual (U.S. Soil Conservation Service, 1986).

A distributed model often requires spatial variation. Thus, catchments are introduced into this study and used to discretise the map so that the model could more accurately evaluate regional rainfall-runoff volumes, topographical changes and drainage capabilities within study areas. Furthermore, the catchment delineation depends on topographical and drainage network data (Mark et al., 2004). It can be presented by the Thiessen polygon method (Thiessen, 1911), in the terms of main manholes. Figure 2 presents 54 rainfall-runoff catchments used to discretise the WP map. The runoff volume over the $m$th catchment can be expressed as

$$Q^p_m - Q^f_m = \sum_{n=1}^{N} A_n R_n$$

(4)

where $n$ denotes the $n$th type land, such as grassland, carpark or building land. $A_n$ means the projected area of the $n$th type land on the $m$th catchment.

Urban drainage model aims to simulate underground drainage pipe networks and run flow computations. This research employs a simplified drainage system, which is derived mainly from field observations. So far, several hydrologic models have been exploited and developed, such as SWMM (Rossman, 2010), Infoworks-CS (Wallingford Software, 2006) and the Modelling of Urban Sewers (MOUSE) (Danish Hydraulic Institue, 1999). As an advanced modelling package, MOUSE is employed in this research to simulate the water flow of drainage systems and provide fully a hydrodynamic pipe flow model because its pipe flow model engine can efficiently analyse the drainage network performances (Kubý and Gustafsson, 2001).

5 Increases in Rainwater Runoff Induced by Regional Development

Land uses are not invariable. Deakin University has been one of Australia’s fastest-growing universities in the last decade. Among its campuses, an anticipated increase at WP campus will be equivalent to an additional 11,000 EFTSL in 2020, which will account for 16.2% of the total growth. The campus has been upgrading facilities and constructing infrastructure in response
to the increasing demands of teaching and research. In particular, the university has made considerable capital investment in new buildings since 2013. AU$300m of approved projects under construction is expected to be progressively completed in 2015, according to the latest campus infrastructure plan (Deakin University, 2013). Yet, the significant growth of campus infrastructure could lead to environmental impacts, even hazards risk. To analyse the inundation risk, Table 1 listed the top 20 catchments, in which land-use changes over the last decade led to the significant increases in rainfall-runoff volumes.

Table 1: Top 20 increases in the runoff volume due to land-use changes

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Area</th>
<th>Proportion of raw land (%)</th>
<th>Proportion of building land (%)</th>
<th>Proportion of carpark (%)</th>
<th>Runoff increase</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>17658 m²</td>
<td>100.0 → 37.51</td>
<td>0.00 → 5.46</td>
<td>0.00 → 36.54</td>
<td>392.07 m³</td>
<td>1</td>
</tr>
<tr>
<td>51</td>
<td>25192 m²</td>
<td>99.96 → 67.39</td>
<td>0.04 → 12.69</td>
<td>0.00 → 12.72</td>
<td>298.47 m³</td>
<td>2</td>
</tr>
<tr>
<td>44</td>
<td>28850 m²</td>
<td>93.79 → 68.54</td>
<td>0.00 → 14.39</td>
<td>0.00 → 3.54</td>
<td>255.44 m³</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>13363 m²</td>
<td>70.85 → 19.41</td>
<td>0.00 → 0.00</td>
<td>22.66 → 74.10</td>
<td>250.09 m³</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>31583 m²</td>
<td>100.0 → 79.36</td>
<td>0.00 → 16.91</td>
<td>0.00 → 0.00</td>
<td>237.09 m³</td>
<td>5</td>
</tr>
<tr>
<td>39</td>
<td>19064 m²</td>
<td>58.38 → 23.93</td>
<td>21.33 → 32.36</td>
<td>5.33 → 21.08</td>
<td>231.98 m³</td>
<td>6</td>
</tr>
<tr>
<td>43</td>
<td>13062 m²</td>
<td>100.0 → 50.80</td>
<td>0.00 → 18.25</td>
<td>0.00 → 16.56</td>
<td>224.25 m³</td>
<td>7</td>
</tr>
<tr>
<td>47</td>
<td>22198 m²</td>
<td>100.0 → 69.32</td>
<td>0.00 → 7.41</td>
<td>0.00 → 0.68</td>
<td>215.10 m³</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>24635 m²</td>
<td>74.41 → 55.07</td>
<td>0.00 → 0.00</td>
<td>21.06 → 40.41</td>
<td>173.34 m³</td>
<td>9</td>
</tr>
<tr>
<td>46</td>
<td>24084 m²</td>
<td>100.0 → 81.24</td>
<td>0.00 → 8.78</td>
<td>0.00 → 3.45</td>
<td>164.37 m³</td>
<td>10</td>
</tr>
<tr>
<td>41</td>
<td>33363 m²</td>
<td>72.40 → 58.35</td>
<td>17.62 → 28.10</td>
<td>5.21 → 5.21</td>
<td>153.88 m³</td>
<td>11</td>
</tr>
<tr>
<td>04</td>
<td>11345 m²</td>
<td>97.19 → 60.64</td>
<td>1.03 → 31.28</td>
<td>1.78 → 3.91</td>
<td>146.06 m³</td>
<td>12</td>
</tr>
<tr>
<td>23</td>
<td>18218 m²</td>
<td>84.16 → 63.64</td>
<td>0.00 → 0.00</td>
<td>1.69 → 22.21</td>
<td>135.99 m³</td>
<td>13</td>
</tr>
<tr>
<td>31</td>
<td>20845 m²</td>
<td>91.42 → 75.22</td>
<td>0.00 → 3.58</td>
<td>0.00 → 5.22</td>
<td>112.94 m³</td>
<td>14</td>
</tr>
<tr>
<td>28</td>
<td>14367 m²</td>
<td>83.97 → 63.55</td>
<td>2.81 → 13.33</td>
<td>8.93 → 10.87</td>
<td>101.15 m³</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>15659 m²</td>
<td>59.68 → 43.02</td>
<td>0.00 → 6.80</td>
<td>19.19 → 26.75</td>
<td>93.79 m³</td>
<td>16</td>
</tr>
<tr>
<td>53</td>
<td>11010 m²</td>
<td>70.86 → 47.07</td>
<td>9.44 → 21.32</td>
<td>0.00 → 6.70</td>
<td>91.14 m³</td>
<td>17</td>
</tr>
<tr>
<td>30</td>
<td>9356 m²</td>
<td>92.75 → 65.75</td>
<td>0.13 → 15.57</td>
<td>0.29 → 7.64</td>
<td>90.55 m³</td>
<td>18</td>
</tr>
<tr>
<td>52</td>
<td>32628 m²</td>
<td>78.04 → 71.52</td>
<td>0.66 → 4.84</td>
<td>0.00 → 0.00</td>
<td>66.48 m³</td>
<td>19</td>
</tr>
<tr>
<td>49</td>
<td>20456 m²</td>
<td>67.30 → 57.12</td>
<td>10.17 → 12.58</td>
<td>6.30 → 6.30</td>
<td>65.44 m³</td>
<td>20</td>
</tr>
</tbody>
</table>

It could be observed from the distribution of top catchments that the most development was concentrated in the north-western, northern and south-eastern regions between Jul04 and Jan15. Columns 3, 4 and 5 listed the change in proportions of raw land, building land and carpark in each catchment over the period, respectively. It is clear that initial land uses did not contain
building land within most of these catchments. Also, previous soil types did not contain carpark in half of these catchments.

By Jan15, a marked change was that the percentage of raw land which belonged to Catchment 45 decreased to 37.51% from 100%, chiefly because the percentage of building land had a rise of 5.46%, 36.54% for carparks and 16.70% for roads. As a result, the land-use effect led to a fall of 392.07 m³ in the infiltration volume as shown in Columns 6. Within the south-eastern region, the facility construction generated a 237.09 m³ rainfall-runoff volume over Catchment 11, 173.34 m³ over Catchment 12, 164.37 m³ over Catchment 46, 215.10 m³ over Catchment 47, 65.44 m³ over Catchment 49, 224.25 m³ over Catchment 43 and 255.44 m³ over Catchment 44. Among them, the proportion of building land increased 18.25 percent for Catchment 43, and the proportion grew 16.91 percent for Catchment 11. Much raw land was used for building construction in the two catchments, which led to 127.18 m³ and 26.7 m³ runoff volumes respectively. In addition, the 3496.14 m² raw land was converted into building land within Catchment 41, and land for path increased by 1192.14 m³. Corresponding contributions to runoff volumes were respectively 127.18 m³ and 26.7 m³. In the south-eastern region of WP campus, a complex of new buildings was completed for improving student accommodation within Catchments 4, 28, 30 and 31, but 450 m³ total rainwater runoff contributed to drainage volumes, even overland flow. To sum up, the expansion of impervious ground surfaces occurred at high elevation, which increased risks of sewer surcharge for around manholes and flooding inundation for downstream regions.

Table 2: Water depths at ponding sites for different land uses and rain events

<table>
<thead>
<tr>
<th>Location</th>
<th>Rain H</th>
<th>Rain A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jul04</td>
<td>Jan15</td>
</tr>
<tr>
<td>Site A</td>
<td>32.6 cm</td>
<td>32.6 cm</td>
</tr>
<tr>
<td>Site B</td>
<td>58.6 cm</td>
<td>62.8 cm</td>
</tr>
<tr>
<td>Site C</td>
<td>26.7 cm</td>
<td>30.8 cm</td>
</tr>
<tr>
<td>Site D</td>
<td>27.7 cm</td>
<td>28.9 cm</td>
</tr>
<tr>
<td>Site E</td>
<td>26.4 cm</td>
<td>27.2 cm</td>
</tr>
<tr>
<td>Site F</td>
<td>0.6 cm</td>
<td>1.3 cm</td>
</tr>
<tr>
<td>Site G</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The ponding water produced by Rain H started within Catchments 1 and 16 at around 02:00, it then waterlogged in Catchments 15, 36 and 42. When WP campus experienced Rain A, flood inundation appeared to be in the low-lying area of Catchment 42 at around 11:00, then the floodwater appeared in many regions simultaneously, such as Catchments 1, 8, 11, 15, 16 and 36. Table 2 listed water levels for different reference sites shown in Figure 2 when storm-induced floods reached maximum ponding status after peak rain intensities.

Flooding levels induced by Rain A were usually deeper than ones from Rain H at reference sites. The serious flooding was derived mainly from the dramatic change and high peak value in the rainfall intensity for Rain A. Water levels were also deepened due to the increase in the impervious ground surfaces between Jul04 and Jan15. The water depth produced by Rain A at Site A slightly increased. Instead, the depth at Site C was only slightly grew. The development of WP campus over the construction period was more likely to impact the water level to the east of Building $ka$ under Rain A and the water level of flooding on Nicol Drive North under Rain H. In addition, it could be observed from Row 4 of Table 2, the serious flooding appeared to be at Site B. The constructed buildings and carparks contributed the growth of 4 cm ponding depth for these two rainfall events, which meant the increase in the disaster risk of flooding Buildings $jc$ and $jb$. Less rainwater was ponding at high elevation like Sites F and G, compared to other reference locations. However, Site G is located on a main road according to the current layout of campus infrastructure. Large expansion of urban areas led to the ponding water of 22.5 cm depth on the newly built road. Overall, the great increase in urbanised areas deepened flooding extents on roads of low-lying areas and rose the disaster risk of flooding Buildings to a certain extent.

6. Conclusions

This paper selected flood inundation as urban disaster research because it has been a growing development challenge for many cities around the world and the most expensive natural hazard in Australia. This research established a framework of modelling urban flood inundation to exanimate impacts on flash floods generated by land-use changes. The research chose Geelong WP campus of Deakin University as a study case, which was acted upon by 100.26 mm rainstorm loads according to different rainfall distributions. Results presented here demonstrated the impacts on flood inundation from different infrastructure layouts, and they revealed that the construction-induced increase in the impervious ground surfaces tended to affect downstream flooded low-lying areas so that pipe networks had to be exposed to more
drainage pressures. After comparison of ponding depths, the great increases in urbanised areas deepened flooding extents on roads of low-lying areas and rose the disaster risk of flooding Buildings to a certain extent. It also indicated that the model has satisfactory accuracy and good adaptability.

Additionally, this study is beneficial to urban planning and emergency preparation. Hence, the research could be applied to flood assessment measures for urban development, and results can be utilised in governmental planning to raise awareness of flood hazard impacts. To be more complete, this research can be further improved through more accurate data and extended to the application of flood risk estimation in large-scale urban development.

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Victorian Regional Passenger Rail 2050:

A strategy for growing Victoria’s regional passenger rail services and their role in the growth and sustainability of regional Victoria.

Presented by the Rail Futures Institute
for the Australian Regional Development Conference
Albury NSW, August 2015

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Regional development, planning and local government consultant and former Planning Institute President.

With specialist input from:
- Peter Don
- David Hardy
About The Rail Futures Institute

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Tel: 0408 005 558
Abstract

The evolution of Victoria’s regional cities and towns has reached a turning point. Decades of minimal or negative growth have been reversed in recent years by significant population increases in many regional cities and towns, driven by (inter alia) unprecedented metropolitan growth, emerging preferences for alternatives to congested city life, rising capital city house prices, improved lifestyle, social and cultural amenities in regional cities; and improved road and rail links. Government investment over the last decade in Victorian regional passenger rail has been a significant factor in the mix.

These trends are set to continue, driven by the centralising momentum of “agglomeration and critical mass economics” partially balanced by Government policies to divert some growth from Melbourne to surrounding towns and cities.

Of all Australian States, Victoria’s settlement pattern most closely resembles the “European Model” of a network of connected cities within reasonable distance of each other. It also has (despite shortcomings) the nation’s best regional rail passenger network providing a strong base for future improvement. Despite significant differences between Victoria and Europe, there is considerable potential to build on the State’s historical legacy and new-found growth momentum towards a sustainable, multi-city model of urban settlement.

Passenger rail can and should play a key role in managing and directing Victoria’s population growth: Faster and more frequent rail services between Melbourne and the regional cities would be the single most effective tool for redirecting growth to regional centres, reducing pressure on Melbourne’s outward growth, changing Victoria’s urban development patterns and creating new lifestyle and employment options through reduced travel times.

It is timely to firm up this vision, as Public Transport Victoria undertakes community input into a “Regional Network Development Plan” blueprint for regional public transport services.

The paper develops a vision for regional passenger rail services to 2050 to serve and shape the future pattern of Victoria’s regional and urban development and develop an overarching strategy including travel demand scenarios, travel markets, proposed routes, services and frequencies, rolling stock and infrastructure requirements, revenue and cost recovery, institutional arrangements, funding models, coordination of transport and land use planning in regions; and broader economic, social and environmental considerations.
About the Authors

John A Hearsch, Principal, John Hearsch Consulting Pty Ltd, has been an Australian career railwayman and transport administrator for over 50 years.

Starting in the Victorian Railways in 1959, he became Chief General Manager, Operations of the newly formed V/Line in 1983, managing all operational and engineering functions of its freight and regional passenger services. From 1991, John was Group General Manager, Freight of Queensland Rail (QR), responsible for the marketing, operational and maintenance performance of QR’s extensive freight business.

Since 1998 John’s consultancy has advised government and the private sector on railway management and strategic issues.

In 2012, the Railway Technical Society of Australasia honored John with its award for the most outstanding individual contribution to Australia’s rail industry.

John is a graduate in commerce and economics from the University of Melbourne, a Fellow of the Chartered Institute of Logistics and Transport; and President of the Rail Futures Institute.

Dr E W (Bill) Russell, Managing Director of EW Russell and Associates Pty Ltd, has been Professor at five universities including eight years co-director at the Australasian Centre for the Governance and Management of Urban Transport at Melbourne University.

Bill headed two Victorian Government departments and is a former SECV commissioner.

He has been involved in major change in the energy, water and transport industries over 35 years and has undertaken many studies in regional areas, including the Central Murray Regional Transport Study in 2014 and Railing Ahead for Loddon-Mallee RDA. He is foundation Secretary of Rail Futures Institute Inc.

Peter Tesdorpf is principal of Peter Tesdorpf and Associates, consultants in regional development, urban affairs, planning and local government, and has over 40 years professional experience spanning local and metropolitan government, regional development organisations, the private and community sectors.

He played a key role in establishing several regional development organisations and is a former Victorian President of the Planning Institute of Australia (PIA).
1. Regional Passenger Rail in Victoria: A Historical Snapshot

The railways played a pivotal role in Victoria’s early settlement and development, opening up the entire State, connecting the hinterland with the capital Melbourne, providing access to ports for export of agricultural produce; and providing social and economic links between towns and cities. Indeed, at rail’s peak, there was a vast network of lines reaching nearly every town (the self-described “backbone of the State”) and the Victorian Railways (the “VR” as it was fondly known) was a major institution in the life of Victorians.

The spread of mass-produced motor vehicles from around the 1950s and subsequent development of the road network, combined with changing transport economics and to some extent the failure of the railways to innovate and adapt to change, triggered a slow but steady decline of the rail system, punctuated by occasional advances such as the 1962 Melbourne-Sydney standard gauge project.

By the end of the 1970s, country passenger train service quality and patronage had declined to a historical low, characterised by ageing equipment, antiquated operational practices and a perceived irrelevance by the public.

Fast forward 35 years and - despite regular public criticism and ongoing operational shortcomings - Victoria now enjoys the highest quality, most sophisticated and most highly patronised regional passenger rail system in Australia, “by a country mile”, providing a strong base for further improvement.

This turnaround in position can be attributed in part to three significant injections of funds and operational reforms over the last 30 years, each providing improved and revitalised services:

- The so-called New Deal for Regional Passengers, implemented by the Cain government and Minister Crabb in the 1980s, under which faster services with new air conditioned carriages and locomotives replacing pre-war wooden carriages, combined with major operational and network reforms;

- The 2005 Regional Fast Rail project under the Bracks government, introducing 160 kph operation, new VLocity trains and much rebuilt track and signalling, transforming the role of services to regional centres (particularly within the two-hour radius of Melbourne) resulting in major increases in patronage not seen in other States; and

- Under the regime of Infrastructure Australia and Minister Albanese, the Regional Rail Link project, completed in 2014, the first and largest transport infrastructure project to face full Infrastructure Australia scrutiny and approval - which promises greater capacity and reliability and shorter journey times to some regional centres by separating regional from suburban trains.
Increased petrol prices and the 2005 regional fare reductions have also contributed to the growth in regional passenger rail patronage over the past decade, however the infrastructure and service improvements have been the primary factor.

Today, Victoria’s regional passenger rail services perform a variety of distinct yet related functions, which each need to be considered separately. In general these are:

- Links between Melbourne and the major regional cities within the “2 hour” radius: Geelong, Ballarat, Bendigo, Shepparton and Latrobe City.


- Links between Melbourne and what might loosely be called “commuter belt” or “peri-urban” towns, such as Seymour, Broadford, Kilmore, Wallan, Kyneton, Woodend, Castlemaine, Warragul/Drouin, Bacchus Marsh and Ballan.
2. Victoria’s Regional Cities and Towns: Entering a New Era

The evolution of Victoria’s regional cities and towns has reached a significant point in history:

After decades of minimal or negative growth, the last 10 to 15 years have seen significant population increases (both in sheer numbers and rates of growth) in many regional cities and towns. Factors driving this trend include:

- Unprecedented population growth in Metropolitan Melbourne, prompting some to seek an alternative to congested city life;
- Rising house prices driving a search for more affordable housing in regional cities and towns;
- Improved road and rail links, especially to the regional cities within 2 hours of Melbourne; and
- Improved lifestyle, social and cultural amenities in regional cities.

Further acceleration of this trend is likely to continue, driven by a continuation of the above-mentioned factors, the momentum of “agglomeration and critical mass economics” (both in Melbourne and in the larger regional cities); and to some extent State Government policies which seek to divert some growth from greater Melbourne to regional centres (although as we discuss later, these policies in themselves are not sufficiently robust to achieve the level of population growth redistribution that is needed).

Of particular significance is that, of all the Australian States, Victoria’s settlement pattern most closely resembles the “European Model” of a network of connected cities within reasonable distance of each other, albeit our regional cities are much smaller in population.

Despite significant differences remaining between Victoria and Europe, there is considerable potential to build on the State’s historical legacy and recent growth momentum to further advance towards a sustainable, multi-city model of urban settlement.
3. Population Growth Projections for Victoria

*Victoria In Future 2014: Population and Household Projections to 2051 (DTPLI May 2014)* contains the most recent population growth projections for Victoria.

The following tables, produced from the VIF data, provide an overview:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>5,537,800</td>
<td>6,607,900</td>
<td>7,699,100</td>
<td>8,796,000</td>
<td>10,011,000</td>
<td>2,161,200</td>
<td>2,311,900</td>
<td>4,473,100</td>
<td>80.78%</td>
</tr>
<tr>
<td>Greater Melbourne</td>
<td>4,169,400</td>
<td>5,075,000</td>
<td>5,956,900</td>
<td>6,841,900</td>
<td>7,826,000</td>
<td>1,787,500</td>
<td>1,869,100</td>
<td>3,656,600</td>
<td>87.70%</td>
</tr>
<tr>
<td>All Regional Areas</td>
<td>1,368,500</td>
<td>1,532,900</td>
<td>1,742,200</td>
<td>1,954,100</td>
<td>2,185,000</td>
<td>373,700</td>
<td>442,800</td>
<td>816,500</td>
<td>59.66%</td>
</tr>
<tr>
<td>Ballarat</td>
<td>148,700</td>
<td>174,700</td>
<td>205,400</td>
<td>235,200</td>
<td>266,400</td>
<td>56,700</td>
<td>61,000</td>
<td>117,700</td>
<td>79.15%</td>
</tr>
<tr>
<td>Bendigo</td>
<td>142,700</td>
<td>165,900</td>
<td>193,900</td>
<td>221,300</td>
<td>249,600</td>
<td>51,200</td>
<td>55,700</td>
<td>106,900</td>
<td>74.91%</td>
</tr>
<tr>
<td>Geelong</td>
<td>256,600</td>
<td>301,200</td>
<td>351,700</td>
<td>402,000</td>
<td>455,900</td>
<td>95,100</td>
<td>104,300</td>
<td>199,400</td>
<td>77.71%</td>
</tr>
<tr>
<td>Hume</td>
<td>161,300</td>
<td>177,100</td>
<td>197,600</td>
<td>218,300</td>
<td>240,600</td>
<td>36,200</td>
<td>43,000</td>
<td>79,200</td>
<td>49.10%</td>
</tr>
<tr>
<td>Latrobe-Gippsland</td>
<td>250,000</td>
<td>295,300</td>
<td>342,200</td>
<td>398,400</td>
<td>438,900</td>
<td>82,300</td>
<td>96,600</td>
<td>178,900</td>
<td>68.81%</td>
</tr>
<tr>
<td>North West</td>
<td>149,600</td>
<td>155,100</td>
<td>166,000</td>
<td>178,600</td>
<td>194,000</td>
<td>16,300</td>
<td>28,000</td>
<td>44,300</td>
<td>29.61%</td>
</tr>
<tr>
<td>Shepparton</td>
<td>127,000</td>
<td>137,300</td>
<td>150,900</td>
<td>165,100</td>
<td>181,300</td>
<td>16,200</td>
<td>30,400</td>
<td>46,600</td>
<td>37.76%</td>
</tr>
<tr>
<td>Warrnambool and South West</td>
<td>122,600</td>
<td>126,100</td>
<td>134,500</td>
<td>145,100</td>
<td>158,300</td>
<td>11,900</td>
<td>23,800</td>
<td>35,700</td>
<td>29.12%</td>
</tr>
</tbody>
</table>

Some notable observations are as follows:

a) Victoria’s population is projected to grow from approximately 5.5 million in 2011 to 10 million in 2051 - an 81% increase in 40 years.

b) Current VIF projections, based on “business as usual” planning and regional development policy settings, would see 82% of this population increase accommodated in Greater Melbourne and just 18% in regional Victoria, with the
Geelong, Ballarat, Bendigo and Latrobe/Gippsland regions accounting for about three-quarters of that.

c) In 2011, Greater Melbourne accounted for 74% of the State’s population and regional Victoria for the remaining 25%. The projections show that by 2051, this spatial imbalance will be even further entrenched, with Greater Melbourne accounting for over 78% of the State’s population and regional Victoria less than 22%.

d) Over the 40 years from 2011 to 2051, Greater Melbourne will absorb 82% of the State’s population increase (3.6 million new people) and regional Victoria less than 22% (816,000 new people).

e) During these 40 years, Greater Melbourne will experience an 88% population increase compared to just under a 60% increase for regional Victoria. The highest growth rates will be in the Geelong, Ballarat, Bendigo and Latrobe/Gippsland regions and the lowest growth rates will be in the North-West and Warrnambool/South-West regions; with moderate growth in the remaining regions.
4. Existing Policy Framework for Regional Growth

In recognition of growth projections for Victoria’s population to reach 10 million by 2051, the Plan Melbourne metropolitan strategy, the eight Regional Growth Plans and the Victoria Planning Provisions (VPPs) (statutory planning schemes) contain policy settings in support of regional growth and attempting to rebalance the share of population growth between Melbourne regional Victoria. These are addressed below:

4.1 Plan Melbourne

One of the key themes of the Plan Melbourne metropolitan strategy is to create a “State of Cities”. This is expressed as follows:

“…The regional cities will need to take a greater share of Victoria’s expected growth…it is important to consider an alternative State growth scenario whereby the regions begin to capture a greater share of Victoria’s overall population growth…Research has confirmed that in many cases the cost of servicing residents in regional centres is significantly below the cost of servicing residents in the growth areas of capital cities…”

Stated polices and actions intended to achieve this outcome include:

- Rebalancing Victoria’s population growth from Melbourne to rural and regional Victoria over the life of the strategy.
- Integrating metropolitan, peri-urban and regional planning strategies with transport planning and implementation.
- Establishing a permanent growth boundary around the metropolitan area.
- Protecting peri-urban areas to ensure retention of high-value agricultural land.
- “Unlocking growth potential of the regional cities” by identifying employment precincts, urban renewal and infill projects and improved social, civic and cultural facilities.
- Working with local government to support housing and employment growth in regional cities.
- Increasing land supply and housing in the peri-urban growth towns of Ballan, Bacchus Marsh, Kilmore, Broadford, Warragul/Drouin and Wonthaggi.
- Ensuring infrastructure to support growth of regional industries and access to export markets.
- Improving transport connections between cities.
4.2 The Victoria Planning Provisions (VPPs)

Regional growth policy contained in Plan Melbourne and the various Regional Growth Plans is translated into statutory form via Clause 11: Settlement of the State Planning Policy Framework (SPPF) of the VPPs and these provisions sit within every Victorian Planning Scheme.

Clause 11.04-6: A State of Cities seeks to “maximise the growth potential of Victoria by developing a state of cities which delivers choice, opportunity and global competitiveness” by way of the following strategies:

- Deliver a permanent boundary around Melbourne.
- Rebalance Victoria’s population growth from Melbourne to rural and regional Victoria.
- Integrate metropolitan, peri-urban and regional planning implementation.
- Improve connections between cities.

Clause 11.05: Regional Development seeks to promote the sustainable growth and development of regional Victoria through a network of settlements identified in the Regional Victoria Settlement Framework Plan. (See attached plan).

This plan identifies a “regional hierarchy” comprising 10 Regional Cities, and 17 Regional Centres.

Regional Cities are (in alphabetical order):
- Ballarat
- Bendigo
- Geelong
- Horsham
- Latrobe City (Traralgon/Morwell/Moe conurbation)
- Mildura
- Shepparton
- Wangaratta
- Warrnambool
- Wodonga/Albury

Of the 10 Regional Cities, all have passenger rail services except Horsham and Mildura; although both once enjoyed them.

Regional Centres are (in alphabetical order):
- Ararat
- Bacchus Marsh
- Bairnsdale
- Benalla
- Castlemaine
• Colac
• Echuca
• Gisborne
• Hamilton
• Kyneton
• Leongatha
• Maryborough
• Portland
• Sale
• Swan Hill
• Warragul/Drouin
• Wonthaggi

Of the 17 Regional Centres, all have passenger rail services except Hamilton, Leongatha, Portland and Wonthaggi; although all four once enjoyed them.

4.3 Regional Growth Plans

Eight Regional Growth Plans (RGPs) have been prepared to guide planning, growth and development of Victoria’s regions.

The eight regions are defined as follows:
• Central Highlands
• G21 Geelong
• Gippsland
• Great South Coast
• Hume
• Loddon Mallee North
• Loddon Mallee South
• Wimmera Southern Mallee

The key provisions of each RGP are incorporated into the State Planning Policy Framework (SPPF) section of the Victoria Planning Provisions as part of Clause 11: Settlement and form part of every planning scheme.

Clause 11 also contains a summary version of each of the eight Regional Growth Plans.
5. Victorian Regional Rail Today

5.1 Existing Regional Rail Passenger Network and Services

Commuter Services

Commuter rail passenger services link Melbourne with Waurn Ponds (Geelong), Wendouree (Ballarat), Eaglehawk/Epsom (Bendigo), Seymour and Traralgon.

On the Geelong line off-peak frequency on Weekdays is 20-60 minutes, with peak hour frequency every 10 minutes. On the Ballarat, Bendigo, Seymour and Traralgon lines off-peak frequencies are 60-90 minutes, with 2-3 services per hour at peak times.

Longer Distance Services

Longer distance rail passenger services run to Warrnambool, Ararat, Maryborough, Swan Hill, Echuca, Shepparton, Albury/Wodonga and Sale/Bairnsdale. All these services are currently broad gauge except for trains to the North-East (Albury-Wodonga) which operate on standard gauge, and the limited and obsolescent interstate services to Sydney and Adelaide, also standard gauge.

On weekdays three return trips are operated to Warrnambool, Ararat, Shepparton, Albury/Wodonga, and Sale/Bairnsdale, two return trips to Swan Hill, and one return trip to Echuca and Maryborough. On most routes this service level has existed since 1981, and is well overdue for enhancement in all corridors.

Equipment

These rail passenger services are provided by a mixed fleet of locomotive hauled carriages, and an ever expanding fleet of self-propelled diesel multiple unit trains (DMUs).

Coach Services

In addition, an extensive network of V/Line coach services in many cases connecting with trains, provides trans-regional passenger services and services to country locations no longer served by rail; and to country locations away from railway lines and some useful interstate connections.

Passenger Numbers

In 2013/2014, 13.2m passenger journeys were made on V/Line train services, and 1.3m coach journeys for a total V/Line patronage of 14.5m.
Rail patronage by corridor and the increase in patronage over the last 5 years is shown in the following table:

<table>
<thead>
<tr>
<th>V/Line Rail Corridor</th>
<th>Passenger Journeys 2013/2014</th>
<th>Increased Patronage Over 5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waurn Ponds, Warrnambool</td>
<td>4.2m</td>
<td>19%</td>
</tr>
<tr>
<td>Melton, Bacchus Marsh, Ballarat, Wendouree, Ararat, Maryborough</td>
<td>3.2m</td>
<td>18%</td>
</tr>
<tr>
<td>Kyneton, Bendigo, Eaglehawk, Epsom, Swan Hill, Echuca.</td>
<td>2.3m</td>
<td>(23)% (See Note 1)</td>
</tr>
<tr>
<td>Seymour, Shepparton, Albury</td>
<td>1.5m</td>
<td>25% (See Note 2)</td>
</tr>
<tr>
<td>Traralgon, Sale, Bairnsdale.</td>
<td>2.0m</td>
<td>13%</td>
</tr>
<tr>
<td><strong>TOTAL RAIL JOURNEYS</strong></td>
<td><strong>13.2m</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Patronage decrease over 5 years reflects Sunbury passengers now travelling on Metro electric trains.
Note 2. Patronage increase inflated by replacement of Albury trains by road coaches during part of period.

5.2 Operational Performance

Reliability and Punctuality

Performance of rail services is measured by two criteria, their reliability in that the scheduled train service is actually operated as a train; and secondly as to punctuality measured in the actual time of arrival compared to schedule at the terminal station.

Reliability has a target that at least 96% of scheduled rail services will be operated for both Commuter and Longer Distance services.

Punctuality has a target that 92% of Commuter rail services will arrive at the destination within 6 minutes of schedule, and 92% of longer distance services will arrive at the destination within 11 minutes of schedule.

Major Factors Affecting Reliability of Operations

These include:

a) Reliability of older locomotive-hauled carriages, especially those used on the standard gauge Albury/Wodonga and other Longer Distance services.

b) Replacement of train services by coaches due to track works or defective trains.

c) Trespassers and level crossing incidents.

d) Infrastructure deficiencies on specific lines, including:
- Geelong/Warrnambool line: Single line track between South Geelong and Waurn Ponds.
- Ballarat line: Single line track between Deer Park and Melton and inadequate track infrastructure between Deer Park and Ballarat at selected locations.
- Bendigo line: Suburban congestion between Sunshine and Sunbury and lack of track infrastructure between Kyneton and Harcourt.
- Seymour and Shepparton lines: Suburban congestion between Southern Cross and Craigieburn, and restrictions imposed by outdated mechanical signalling at Wallan, Kilmore East and Broadford.
- Albury/Wodonga line: Protracted poor track quality between Seymour and Wodonga, unreliability of carriages and V/Line not having control over ARTC tracks.
- Traralgon/Sale/Bairnsdale line: Severe suburban congestion between Southern Cross and Pakenham, coupled with inadequate track infrastructure between Bunyip and Longwarry, and at selected locations between Moe and Traralgon.

5.3 Capacity and Demand

Commuter Services at peak times have capacity issues currently in all corridors especially Ballarat, but on weekday off-peak times and on weekends the current fleet is generally able to meet all current forecast demands.

Demand for improved frequency of weekday daytime services is observed in the Ballarat and Bendigo corridors, especially where an early move to 40-minute all-day frequencies would now be appropriate.

Longer Distance Services are generally able to meet all current demands for capacity on current services.

Given these longer distance services are still largely operating on the same frequencies as in 1981 despite a significant increase in population in rural Victoria, there is consistent demand for additional services. In the case of Warrnambool, Ararat, Shepparton and Albury this is for later weekday AM departures to Melbourne and mid-afternoon departures from Melbourne. With Maryborough and Echuca, the demand is primarily for an additional weekday service pair departing from Melbourne just after 0900 and departing back from both those centres early afternoon. With Sale, the main demand is for an earlier 0600 service from Sale in the morning and an extra afternoon service from Melbourne.

5.4 Service Suitability and Quality

Frequently noted issues in this regard include:

- Demand for greater daytime frequencies on the Bendigo and Ballarat lines.
- More express peak services on the Geelong, Ballarat and Bendigo lines.
- Capacity and reliability issues on the Ballarat/Bacchus Marsh corridor.
- Reliability of Kyneton, Bendigo, Swan Hill and Echuca services adversely affected by ongoing Metro conflicts between Sunshine and Sunbury.
- Ongoing agitation from Albury main line centres and Shepparton for additional services and faster travel times to Melbourne.
- Gippsland line services being delayed between Pakenham and Southern Cross due to ongoing conflicts with Metro services.
- Service reliability beyond Geelong being impacted by inadequate single line infrastructure to South Geelong, Marshall and Waurn Ponds.

Internal train cleanliness is generally good and well regarded by travellers, however external cleanliness is often very poor.

On train catering is currently provided on longer distance train services to Warrnambool, Swan Hill, Albury and Bairnsdale and most services to Shepparton. While reasonably well supported, these services involve antiquated operating practices such as early closure well in advance of arrival at terminal stations to undertake repetitive stocktakes, generating considerable customer dissatisfaction.

5.5 Interfaces and Co-ordination with Other Travel Modes

V/Line rail passenger services interface with other travel modes at various locations in respect of cycling, private car, urban bus services, V/Line coach services, other country bus services; and in Melbourne with Metro train services, tram and urban bus services.

Cycling: Cycle parking facilities are provided at most V/Line stations especially within the Commuter area. Cycling to stations is an ever-increasing mode of getting to and from V/Line rail services; and facilities are generally extended and improved to meet local demand.

Private Motoring: Extensive commuter parking is provided at Commuter area stations, as well as kiss n ride set down and taxi ranks at major stations. Demand for car parking spaces continues to outstrip supply at many locations, and a more cost-effective solution is to encourage passengers to walk, cycle or use urban bus services to get to the station. However in very few cases is the frequency of urban bus services sufficient for these to currently be an attractive travel option to get to and from stations.

Urban Bus Services: At present only Geelong, Ballarat and Bendigo urban bus services could be regarded as an attractive option to access V/Line trains. It is only in Geelong so far that a total revamp of bus services and better coordination with trains has been implemented by PTV. A similar review is currently underway at Bendigo for implementation later in 2015; and reviews are yet to be undertaken at Ballarat and the Latrobe Valley. In several other cases co-ordination between rail and urban bus services requires improvement.
V/Line Coach Services: Mostly these services operate either as coach services on routes formerly served by trains, such as Geelong-Ballarat, or on new more direct routes formerly served by circuitous train routes such as Melbourne-Ballarat-Hamilton and Melbourne-Warrnambool-Portland. Current more direct train/coach services have considerably shorter travel times than the old indirect train services. These services are all fully coordinated at major regional stations to provide excellent connections with trains to and from Melbourne and better patronized than the old slower services they replaced.

A number of other country bus services not marketed under the V/Line branding also meet and co-ordinate with V/Line trains at major regional stations.

5.6 Freight Network Interfaces

As on most railway systems, both passenger and freight trains need to share the same tracks. In past decades this was simpler than in today's operating conditions. Factors that have complicated passenger/freight train interfaces include:

- The emergence of “vertically separated railways” (where the organisation that owns or controls the track is different to the operator of the trains);
- Separate passenger and freight railway operators creating tensions over the relative priority of different types of trains;
- Much longer freight trains making pathing and crossing of trains more difficult;
- Higher passenger train speeds relative to freight trains; and
- Growth in demand for passenger services resulting in fewer paths for freight trains.

In Victoria, these issues can manifest in varying degrees depending on line and location. Generally however, given the current relatively low level of rail freight operations, there are few significant impacts on V/Line services at this stage. However as demand for rail passenger services continues to grow, this situation is likely to change, requiring additional crossing loops or recommissioning of former loops. Current examples of freight/passenger interface issues include:

- The single track section of the Gippsland line between Bunyip and Longwarry which disrupts the reliable operation of both passenger and freight traffic and requires early duplication; and
- The single-track section of the standard gauge line between Seymour and Melbourne, where Albury trains are often delayed by late running freight trains.

The recent Victorian Government announcement of the Murray Basin gauge standardisation project (which is to be commended for its foresight and strategic importance) may also introduce new passenger/freight interface issues, particularly if additional rail passenger services and routes are introduced in future.
5.7 **Institutional Framework for Regional Rail Services**

V/Line Corporation (VLC) is a Statutory Corporation under the *Rail Corporations Act 1996* and continues under the *Transport Integration Act 2010*. On 14 October 2008 VLC was declared a State business corporation pursuant to the *State Owned Enterprises Act 1992*, reporting to both the Minister for Public Transport and the Treasurer.

VLC is governed by the *Transport Integration Act 2010*, which sets out its objectives and functions. The Transport Integration Act creates a framework for the provision of an integrated and sustainable transport system; and all Victorian transport agencies, including VLC, are required to work together towards this common vision.

VLC is the sole shareholder of the main operating entity, V/Line Pty Ltd (V/Line). V/Line is a party to a *Services Agreement* with Public Transport Victoria to operate regional rail services throughout Victoria and manage V/Line-branded coach services in regional Victoria.

V/Line also leases and maintains regional Victorian rail assets and provides access to rail freight operators across the country rail network; and leases several lines to the Australian Rail Track Corporation as manager.

5.8 **Travel Markets and Market Segmentation**

Regional rail patronage is determined by the size of the total travel market and factors impacting on its share of the market.

The size of the market is predominately a function of the growth and distribution of population and employment and trip making rates; while regional passenger rail’s share of the total travel market varies with trip purpose and geographical segment.

The purpose for trips made on regional rail include
- Commuting
- Visiting friends and relatives (VFR)
- Educational travel
- Medical and health treatment
- Personal business
- Holidays
- Business
- Shopping

Each V/Line line can be subdivided into two quite distinct geographical segments:
- **The Commuter zone**: dominated by commuters travelling to work in Melbourne; and
- **The Regional zone**: the area beyond reasonable commuting distance of Melbourne.

The relative importance of the factors in each zone varies with trip purpose, but the main factors determining the market share in each market segment are:
- Service provision (timetables, frequency)
- Service quality
- Fuel prices
- Travel times
- Fares
- Special events
- Marketing
- Costs associated with the alternative of car use, such as parking and time spent in traffic.

About 64% of travel is made on full fares and 36% on concession fares. Many travellers on concession tickets do not have the choice of alternative travel because of their age or physical restriction.

**The Commuter Zone**

There has been significant increase in the popularity of passenger rail over the past decade, with patronage on some lines reaching record levels. Growing patronage has been driven by several factors including growing populations, completion of the Regional Fast Rail project, the high cost of petrol - prior to a substantial drop in 2014/15 - and other costs associated with passenger vehicles, such as parking and time spent in traffic. Increased concentration of jobs in central Melbourne has also generated additional demand.

The key markets in the Commuter zone are daily commuters to Melbourne and day return discretionary trips to Melbourne for shopping, medical, visiting friends and relatives (VFR), theatre, sporting events; and students. There is also limited day return travel from Melbourne to country locations for VFR and business; and growing commuter traffic from Melbourne particularly to Geelong. The business is very much driven by daily commuter trips from locations within 90-100 minutes travel time from Melbourne.

- Commuting dominates rail travel markets, with most rail users being frequent travellers making five or more single rail trips per week.
- Most rail travel is made alone.
- Most of the rail market is passengers who only use rail to get to and from Melbourne.
- The commuter rail market is dominated by younger people.
- Slightly more women than men use trains.

Off peak there is strong all-day demand for travel to Melbourne for discretionary purposes with services to Melbourne being heavily loaded up till late morning; and from early afternoon returning services from Melbourne become increasing well patronized. At Weekends there is strong day return traffic both to and from Melbourne, driven primarily by leisure and sporting activities/events. AFL football traffic is a major traffic generator at weekends both to Melbourne and South Geelong.

V/Line is also actively marketing regional getaways to and from regional destinations, with drawcards such as the Bendigo Art Gallery proving effective.
There is some commuter travel from intermediate locations to nearest major regional centres and day return trips, to Geelong, Ballarat, Bendigo, Seymour, Warragul, Moe, Morwell and Traralgon for students, shopping, medical and work.

Strong local travel trips are made within the Latrobe Valley, between Maryborough and Ballarat, between Echuca, Castlemaine and Bendigo; and between Lara and Geelong.

Visiting friends and family (VFR) is the second most common reason behind work for travel.

**The Longer Distance Zone**

Here the primary travel demands are for day return trips from outer regional centres both to Melbourne and regional centres like Geelong, Ballarat, Bendigo, Seymour and Warragul, for business, medical, shopping, entertainment and sporting events.

There is some day return travel from Melbourne and the major regional centres to the outer regional centres; and modest demand for day return travel from Melbourne to longer distance locations, largely VFR and limited tourist traffic especially to Warrnambool, Ararat (Grampians), Maryborough, Swan Hill and Echuca. Former rail-based tourism to Mount Buffalo and the Gippsland Lakes has largely disappeared.

Inter City service levels have remained largely unaltered for over 35 years, while there has been significant population growth in cities along all the major longer distance corridors.

There is consistent market demand for additional travel choices on weekdays, primarily as additional long distance services that would depart from the country termini around 0830 and return from Melbourne around 1530. Such services would be well supported in the Warrnambool, Ararat, Shepparton, and Albury corridors.

Services between Ballarat-Maryborough and Bendigo-Echuca, whilst having a strong day return demand for travel to Melbourne, also have an increasing demand for additional local trip choices between these centres. As such, these two routes lend themselves to a more frequent shuttle service using rolling stock resources more efficiently, but still connecting at Bendigo and Ballarat with mainline services to and from Melbourne.

Shepparton, with an increased line speed and converted to VLocity operation with a two hour travel time to Melbourne, offers potential to increase service frequency to 4-5 return trips on weekdays to build patronage and revenue substantially to the higher levels achieved at other locations like Bendigo (also with a two hour travel time.)

Sale and Colac also offer the opportunity to meet unsatisfied demand for additional trip choices through selective extension of services from Geelong to Colac and from Traralgon to Sale. Swan Hill lacks an evening train or coach to Melbourne, precluding one-day business visits or one-day visits by schools or tourists to the popular Pioneer Village.
6. Some International Comparisons

Benchmarking against sound international practice is one tool for assessing the standards of service offered by regional rail services.

Here some comparisons are made with international services of comparable distance to those offered by V/Line, albeit with many different demographic and technical conditions applying in the various cases cited. The figures given for rail and road coach journey times are the best shown in published timetables; the figures for freeway times are based on information provided in Google searches.

V/Line services to Ballarat, Bendigo, and Geelong have been significantly improved by the investments in Regional Fast Rail, VLocity 160 railcars and most recently Regional Rail Link. These services operate considerably faster than equivalent services around Toronto, are broadly similar with those around Manchester UK, but are slower than those around Hamburg in Germany. Victoria’s regional rail corridor towns can now be reached from Melbourne in transit times comparable or lower than outer suburbs; and these communities have potential to absorb a useful proportion of Melbourne’s expected population growth (perhaps 15-250%) providing competitive transit times with road are maintained and trains are frequent, reliable and offer seated accommodation.

Canada: Toronto

Toronto has an excellent transit system including a Metro, trams and buses. Links with surrounding cities in Ontario, such as Kitchener, London and Hamilton (each of which is larger than Geelong) are provided by a specialist public agency, GO Transit, which operates buses and trains to these destinations. Average speeds are considerably lower than V/Line’s average speeds and freeway transit times around Ontario are faster than rail transit times, whereas in Victoria the reverse is the case.

- Average speed Geelong/Ballarat/Bendigo flagship services: 100 km/h
- Average speed Kitchener/London/Hamilton fastest trains: 69.4 km/h
- V/Line percent advantage over freeway travel time: 8-11%
- GO percent disadvantage compared with freeway: 10-22%
- In both countries rail performs slightly better over the longer journeys.

This probably reflects under-investment in track and rolling stock in Toronto. Given the large populations by Australian standards of the regional Ontario cities surrounding Toronto, the poor rail performance is probably not the result of lack of potential riders.

Following table compares pairs of cities of comparable distance from Toronto or Melbourne in Ontario and Victoria:
<table>
<thead>
<tr>
<th>City</th>
<th>Distance from Melbourne or Toronto (km)</th>
<th>Population</th>
<th>Rail Average Speed (kmh)</th>
<th>Rail Travel Time (minutes)</th>
<th>Freeway Travel Time (minutes)</th>
<th>Rail Time Advantage over Road (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong</td>
<td>75</td>
<td>228,950</td>
<td>87</td>
<td>52</td>
<td>64</td>
<td>7.7</td>
</tr>
<tr>
<td>Hamilton</td>
<td>69</td>
<td>560,000</td>
<td>55</td>
<td>75</td>
<td>48</td>
<td>-22.5</td>
</tr>
<tr>
<td>Ballarat</td>
<td>119</td>
<td>100,283</td>
<td>108</td>
<td>66</td>
<td>83</td>
<td>14.1</td>
</tr>
<tr>
<td>Kitchener</td>
<td>107</td>
<td>219,153</td>
<td>65.5</td>
<td>98</td>
<td>70</td>
<td>-19.6</td>
</tr>
<tr>
<td>Bendigo</td>
<td>153</td>
<td>110,579</td>
<td>104.5</td>
<td>93</td>
<td>106</td>
<td>13.78</td>
</tr>
<tr>
<td>London, Ont</td>
<td>190</td>
<td>352,395</td>
<td>87.7</td>
<td>130</td>
<td>122</td>
<td>-9.76</td>
</tr>
</tbody>
</table>

**UK: Manchester**

Manchester was chosen for UK comparisons, as London is a unique transport setting that cannot readily be compared with Melbourne.

As with the previous case study, three cities have been chosen for comparison with Victoria, on the basis of being located at comparable distances from Manchester to the distance from Melbourne to Ballarat, Bendigo and Geelong.

One of the cities chosen, Birmingham, is located on the UK West Coast Main Line, which has been the subject of considerable upgrading and investment over recent years, and is rated for 200kph running. Trains are operated by Virgin Trains plc and most rolling stock is rated for either 160kph or 200kph operation. A further feature of the Birmingham to Manchester route is that it is considerably shorter than the quickest freeway route between the two cities.

The other two cities chosen, Leeds and Nottingham, are located on less prominent routes that have not been subject to similar investment and where lower operating speeds apply.

Overall, V/Line’s travel times and average speeds are greatly superior to those achieved on the Manchester to Nottingham and Manchester to Leeds services, and vastly superior to the National Express road coach times. For example National Express’s fastest road coach between Manchester and Nottingham takes 225 minutes for 130km, compared to V/Line’s Melbourne to Castlemaine train service which takes 72 minutes for 126km.

As might be expected, Manchester to Birmingham times are reasonable with the fastest train scheduled for 86 minutes for the 113km. However for the Melbourne to Bendigo service, the V/Line flagship 16.57pm weekday service averages a higher speed despite the steep terrain, 150 year old alignment and lower available top speeds.
<table>
<thead>
<tr>
<th>City</th>
<th>Distance from Melb or Manchester (km)</th>
<th>Population</th>
<th>Rail Average Speed (kph)</th>
<th>Rail Travel Time (Fastest) (minutes)</th>
<th>Freeway Travel Time (minutes)</th>
<th>Rail Time Advantage over Road (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong</td>
<td>75</td>
<td>224,926 (2014)</td>
<td>87</td>
<td>52</td>
<td>64</td>
<td>7.7</td>
</tr>
<tr>
<td>Leeds</td>
<td>69</td>
<td>751,500 (2014)</td>
<td>83</td>
<td>50</td>
<td>61</td>
<td>6.7</td>
</tr>
<tr>
<td>Ballarat</td>
<td>119</td>
<td>100,283 (2014)</td>
<td>108</td>
<td>66</td>
<td>83</td>
<td>14.1</td>
</tr>
<tr>
<td>Nottingham</td>
<td>107</td>
<td>310,837 (2013)</td>
<td>52</td>
<td>104</td>
<td>120</td>
<td>19.2</td>
</tr>
<tr>
<td>Birmingham</td>
<td>113 rail km 153 road km via M6</td>
<td>1,085,400 (2012)</td>
<td>79</td>
<td>86</td>
<td>122</td>
<td>43.92</td>
</tr>
</tbody>
</table>

Rail advantage is expressed as rail time saving over freeway journey time (%)

**Germany: Hamburg**

Inter-city German trains reflect persistent investment and technical superiority. They offer inter-city times that are substantially better than Autobahn times despite the high speeds available on those roads.

The following table compares journeys from Hamburg to Hannover and Bremen with similar length journeys in Victoria, namely Melbourne to Ballarat and Melbourne to Bendigo respectively. This table shows the much higher average speeds on the German Railways (DB), which are far in excess of averages in Australia, Canada or Britain. As a result, despite the quality of the German freeway system, rail possesses its greatest advantage in travel time over road in Germany compared to the other countries considered.

Nevertheless V/Line speeds and travel times are reasonable considering the much lower populations served, smaller investments and lower levels of technology.

<table>
<thead>
<tr>
<th>City</th>
<th>Distance from Melb or Hamburg (km)</th>
<th>Population</th>
<th>Rail Average Speed (Fastest) (km/h)</th>
<th>Rail Travel Time (Fastest) mins</th>
<th>Freeway Travel Time</th>
<th>Rail Time Advantage over Road (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballarat</td>
<td>114</td>
<td>100,283 (2014)</td>
<td>108</td>
<td>66</td>
<td>83</td>
<td>14.1</td>
</tr>
<tr>
<td>Bremen</td>
<td>126 road km via A1</td>
<td>550,000</td>
<td>145</td>
<td>52eg 10.20</td>
<td>81</td>
<td>23.5</td>
</tr>
<tr>
<td>Hannover</td>
<td>151 road km via A7</td>
<td>515,140 (2013)</td>
<td>125.8</td>
<td>72eg 06.07</td>
<td>104</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Rail advantage is expressed as rail time saving over freeway journey time (%)
7. Setting the Foundations: Passenger Rail’s Role in Victoria’s Regional Development

Key Propositions

We believe the following three key propositions are fundamental to the future planning and development of Victoria:

- **PROPOSITION 1**
  *There is an urgent need to rebalance growth from metropolitan Melbourne to regional Victoria.*

- **PROPOSITION 2**
  *Planning policy seeks to redirect growth from Melbourne to the regions, but is not adequately backed by effective actions and investment; and population projections point to the opposite outcome.*

- **PROPOSITION 3**
  *Investment in faster regional passenger rail services is the most powerful and effective tool to achieve regional growth and a rebalanced population distribution.*

**PROPOSITION 1**
*There is an urgent need to rebalance growth from metropolitan Melbourne to regional Victoria.*

The continued outward growth and low density sprawl of Melbourne has created intractable problems; and continuation of this trend is unsustainable and unmanageable. These problems include loss of high quality agricultural land for food production, inadequate public transport and infrastructure in outer growth areas leading to social isolation, poor access to employment, unacceptably long commuting times, traffic congestion and high infrastructure costs.

Planning failures in the outer urban growth corridors have led to unavoidable car dependency and severe road congestion must be addressed as a matter of urgency before the disconnect between residency location and commuting destinations becomes totally dysfunctional.

Added to this, Melbourne’s rapid population growth and popularity with overseas investors has created a significant housing affordability problem for many people.

Regional centres have ample capacity to provide new housing supply at affordable prices if high quality rail transport links to Melbourne are provided to ensure access to jobs.
With a projected additional 4.5 million people in Victoria by 2051, now is the ideal opportunity to commence the process of rebalancing growth from Melbourne to the regions.

PROPOSITION 2
Planning policy seeks to redirect growth from Melbourne to the regions, but is not adequately backed by effective actions and investment; and population projections point to the opposite outcome.

Planning policy expressed in Plan Melbourne, the Regional Growth Plans and the State Planning Policy Framework of the Victoria Planning Provisions seeks to maximise the growth potential of Victoria by developing a “State of cities” delivering choice, opportunity and global competitiveness, rebalancing Victoria’s population growth from Melbourne to rural and regional Victoria, fixing a permanent growth boundary around Melbourne and improving connections between cities.

However population projections reveal that, without meaningful policy action and investment in infrastructure, these objectives will not be achieved. Indeed, as illustrated in Section 3, the projections show that the spatial and population imbalance between Melbourne and regional Victoria will be greater by 2051 than it is now.

If this is allowed to occur through weak policy or lack of intervention and infrastructure investment, this would be a lost opportunity of tremendous proportions.

While the policy objectives for regional growth are sound, the implementation actions are vague and unmeasurable and the population targets are rubbery. Increasing land and housing supply, improving the urban, civic and social quality of life in regional centres and improving transport connections are among the listed actions, but there are no clear plans for implementing these initiatives. The Regional Growth Plans, while useful and necessary documents and a welcome and overdue Government initiative, are relatively conservative in that they do not seek to rebalance growth from Melbourne to the regions, but simply seek to direct incremental growth into existing centres and contain no recommendations for improved passenger rail transport.

Instead of accepting the projected outcome for 2051 of 82% of the population increase being absorbed in Greater Melbourne and just 18% by regional Victoria, a target of diverting a further 1 million of the 4.5 million population increase (less than 25%) to regional Victoria would result in 59% of the projected increase being absorbed by Melbourne and 41% by regional Victoria. The distribution of total State population in 2051 would then be 68% in Melbourne and 32% in regional Victoria. This would be a much more balanced outcome with significant economic, social, environmental and housing affordability benefits.

This could be achieved with continued strong investment to improve rail passenger links (and reduce travel times) between Melbourne and the regions; coupled with a suite of
planning, land use and investment policies.

As an example, better utilisation of land could enable population increases in regional cities such as Bendigo, Ballarat, Geelong and the Latrobe Valley and some smaller towns such as Ballan, Kyneton, Kilmore, Seymour and Warragul, of up to 100 per cent, without expanding town boundaries or diminishing heritage values. Minimum population and housing growth targets should be set for all such locations with a target period of say 25-30 years.

**PROPOSITION 3**

*Investment in faster regional passenger rail services is the most powerful and effective tool to achieve regional growth and a rebalanced population distribution.*

Passenger rail can and should play a central role in policies for managing and directing Victoria’s population growth.

Fast and effective passenger rail links between Melbourne and regional centres are the central pre-requisite and the most powerful and effective tool for redirecting growth to the regional centres, reducing pressure on Melbourne’s outward growth, providing access to affordable housing and high quality jobs, distributing economic benefits and social equity across the State; and changing Victoria’s urban development patterns. They are also central to delivering the policy objectives in *Clause 11: Settlement* of the State Planning Policy Framework, especially *Clause 11.04-1 Delivering Jobs and Investment* and *Clause 11.04-2 Housing Choice and Affordability*.

Experience with passenger rail investment in Europe, the USA and more recently China (which has built 16,000kms of high speed rail in the last 10 years) has demonstrated and proven these benefits as well as increasing business productivity, reducing “economic distances” and delivering extensive social and environmental benefits.

In the regional Victorian context however, “high speed rail” (speeds of 300km/h+) are not necessary to achieve the desired policy outcomes and - except for the east coast intercapital corridor – are probably not currently economically viable, although cost estimates for such projects have been revised downward by recent studies.

On the other hand, provision of “**Medium-Fast Rail**” (160-220km/h) rail services between Melbourne and the regional cities would open up sufficient new lifestyle and employment options and population redistribution through reduced travel times. (For example, a one-hour rail journey from Ballarat equates to the current suburban train journey time from Frankston or Lilydale and is faster than a trip from Pakenham).

This speed range is not significantly different to the 160km/h maximum now capable on parts of the RFR network - the key is to achieve these speeds consistently along each corridor and on other existing lines through appropriate infrastructure improvements, including level crossing removals and track re-alignments.
Building such connections would require formal adoption of a network city model where frequent **medium-fast** rail services link regional centres with the metropolitan area and a range of policies is implemented to deliver infrastructure and services that would promote and induce decentralised city and township development.

Further enhancement of infrastructure capability to consistently achieve RFR standards and increase capacity on all five regional corridors emanating from Melbourne and associated further rolling stock procurement will be an essential element in order to accommodate and induce accelerated growth into regional cities and towns within a distance of approximately 160 kilometres and a maximum of 90 to 100 minutes travel time.

The major regional cities have plans and capacity to perhaps double in population, with rail links providing access to capital city employment and services (as occurs in the UK and Europe generally as regards the relation between the capital and cities within 80-90 minutes travel).

At a higher level, a future dedicated true high-speed (300-350km/h) rail service linking Melbourne, Canberra, Sydney and Brisbane would transform settlement patterns on Australia’s east coast including along Victoria’s Hume corridor. Under this scenario for example, journey times to Melbourne from Albury/Wodonga would be one hour, from Shepparton perhaps 45 minutes and from Seymour 30 minutes, significantly repositioning the role of towns and cities along the corridor.

In addition to the wider vision for redistributing population across a “State of Cities” through faster passenger rail, a pipeline of ongoing incremental improvements to rail services is also necessary.
8. Drivers of Demand:  
*Forecasting Future Regional Rail Patronage and Impacts on Population Distribution*

With the available data and research, the impacts of improved rail services on population and business growth and distribution can only be estimated within wide confidence levels.

The potential effects can only be described and perhaps given an order of magnitude value because the demographic and travel pattern changes observed or predicted - particularly the longer term changes - are the result of a wide range of interacting factors, some of which are unrelated to transport.

Nevertheless, broad estimates of these impacts can be made based on available information and within constraints of for a particular project.

*However overseas experience (particularly the European experience with higher speeds) confirms that quality medium-fast rail service, when combined with implementation of other inducements, is a good tool for regional integration and economic development and very effective in shaping land use into a more sustainable form.***

*Further Reading:*  
Appendix B provides further reading for those interested, by canvassing:  
- A detailed outline of the methods used to predict the population and patronage growth impacts of the Regional Fast Rail project;  
- An outline of the various components of patronage growth and the relationship of land use and travel in each component;  
- Current techniques for forecasting rail patronage;  
- The key factors in car-to-rail trip diversion; and  
- The potential impact of the emerging “peak car” phenomena.
9. LOOKING AHEAD:
V/Line Services Over the Next Two Decades
How to achieve the vision outlined in Section 7.

9.1 Regional Rail Can Help Rebalance the Victorian Economy

Melbourne shares with London and Sydney the problem of population concentration in the capital, associated with extremely high house prices, car congestion, and difficulties of access to knowledge based jobs concentrated in high value precincts such as the Melbourne CBD, Docklands, Southbank and St Kilda Rd; and perhaps in the future E-Gate and Fishermans Bend.

Concentration in Melbourne and Sydney is expected by 2061 to absorb 84% and 75% of the population of Victoria and New South Wales respectively, resulting in overwhelming car congestion unless well planned public transport alternatives are provided, of which an efficient V/Line regional rail network is a key component.

In London, massive rail investment is being employed (via the $A80bn HS2 project) to right the imbalance between the capital with its employment opportunities, high levels of population and congestion and the Midlands with high levels of unemployed people unable to access the London job, education and housing markets. UK plans to address this imbalance with transformative rail investment are expected to create over 400,000 jobs by providing connectivity between London and Midland areas, notably Birmingham. Over 14,000 engineers are currently working on this project.

During the next two decades of rapid population growth in Melbourne, the quality of service, geographic scope, frequency and reliability of V/Line regional services will need to evolve rapidly if the problem of imbalance in this state between the Melbourne economy and regional economies is to be rectified. Fast train journey times by direct, often re-engineered routes will be needed. The issue is not just frequency and reliability, but journey time as well if rail is to realise its excellent potential to help balance capital city and regional economies.

The following developments will be essential:

9.2 New Corridors Will be Needed for V/Line Services into Melbourne

Because of the density and frequency of train services on Melbourne’s suburban corridors, it will be necessary to provide dedicated tracks for V/Line trains in each direction, broadly similar to the Regional Rail Link, which was implemented 2009-2015. These new tracks are illustrated in the diagram below and should include:
a) A **Northern Rail Link**, providing fast access to the City from the Bendigo line, Tullamarine Airport and the North East (V/Line regional services and the future High Speed Train to Canberra and Sydney).

- As Tullamarine airport is a trip generator comparable to existing regional cities and is currently not connected to the rail network, it is generating unsustainable levels of car congestion and provides very strong potential demand for rail services, it should form part of the next regional rail link to be constructed. Such airports are always connected to mainline railways in comparable European cities.

- Tullamarine Airport also needs connectivity to the proposed Canberra/Sydney Very Fast Train, so the Northern Rail Link should be constructed from the outset within the appropriate engineering envelope (as to grades, curves and insulation from the surrounding environment whether by tunnelling, noise protection, level crossing avoidance or other measures). Victoria needs to persuade the Commonwealth to define these standards as a matter of priority.
- The Northern Rail Link should initially be constructed from Southern Cross station to Tullamarine Airport, and thence join the Bendigo line around Clarkefield. It would then provide the route for V/Line services from Kyneton, Castlemaine and Bendigo into Melbourne, avoiding dense suburban traffic on the electrified Sunbury to Sunshine route. The connection to High Speed Rail and the north-eastern V/Line network could be implemented later.

b) A **South Eastern Rail Link** serving Dandenong, Gippsland and the Port of Hastings (if it is developed) is also urgently required.

- The current Caulfield-Dandenong-Pakenham rail project provides for the effective reconstruction of the suburban railway to Dandenong and the removal of level crossings. The opportunity needs to be taken to future-proof for the provision of two additional tracks for a south-eastern regional rail link through appropriate design of structures during the current project.

c) Thirdly, a new **Western Regional Rail Link** will ultimately be needed to directly link Geelong and Melbourne.

- The existing Regional Rail Link between Deer Park Junction and West Werribee is likely to develop into an intensively used electrified suburban line as part of the current and impending growth in Melbourne’s west, reproducing for Geelong line passengers the problem it was intended to solve, namely the impeding of regional express trains by local suburban services. The routing of Geelong trains via Deer Park Junction offers no reduction in journey time for Geelong trains, the fastest of which takes an inordinately long 52 minutes for the 73km journey.

- With Geelong’s own growth expected to be in the region of 400,000 to 500,000 by mid-century, the requirement will be for 30-minute journey times between Melbourne and Geelong. This will require a western regional rail link which could be provided by a tunnel commencing near Newport and approaching Southern Cross in a direct line (perhaps with a stop at Fishermans Bend).

9.3 **Connectivity between Melbourne, Regional Cities and Tullamarine Airport**

Mid-century will require connectivity among the six major trip generating nodes on the V/Line network - namely Southern Cross, Tullamarine Airport, Geelong, Ballarat, Bendigo and the Latrobe Valley. Through running of trains will be required (too detailed to discuss
here but for example, from Bendigo via Tullamarine airport to Southern Cross and thence to Geelong or Latrobe Valley).

In addition, rail services among the trip generators will need to be re-instated. The previous Liberal Government developed a Rail Revival project to reinstate passenger trains between Geelong, Ballarat, Maryborough and Bendigo, but obtained an unsatisfactory consulting report that inflated costs and effectively led to the project being sidelined. Moreover, this report did not adequately look at the impact of Murray Basin gauge standardization options on how such a service could efficiently be provided, including issues of staging and routing.

Rapid population growth in Golden Plains Shire in the Bannockburn area would suggest that a staged project that commenced with a reintroduced Ballarat to Geelong service should be considered.

However the route is greatly affected by the outcome of the Murray Basin Rail Project. Once the standardization of the railway from Maryborough to Geelong is completed, the opportunity will be provided for a Geelong-Ballarat-Bendigo service on standard gauge if the standardization were extended to include the railway between Bendigo and Eaglehawk.

Bendigo still has some major heavy industries in Defence (Thales) and rail wagon maintenance (SSR at the former North Bendigo workshops) and this approach would provide these industries with direct access to the standard gauge network. (At present rail wagons for repair at North Bendigo are transported by road).

Such an approach may be more economical than reinstating the disused Maryborough to Castlemaine broad gauge line.

The following diagram illustrates these possibilities:
9.4 Improved Journey Times are Required

The Regional Rail Link has provided an important addition to the passenger carrying capacity of the regional rail network, but has not improved journey times. By contrast, VicRoads regularly realigns freeway routes, reducing gradients and straightening curves.

If the rebalancing of the Victorian economy that rail can assist is to be realised, major rail investments must also deliver faster journeys. Tables provided elsewhere in this report show that the investments in the regional fast rail network, VLocity 160 railcars and the regional rail link have provided a result that is still comparable with good overseas practice and with freeway travel times over similar journeys.

But there are no major projects currently planned that will reduce journey times to truly competitive levels, for example a 30-minute journey from Melbourne to Geelong, or a 42-minute journey from Geelong to Tullamarine Airport.

This is not the place to explore the many issues that would need to be resolved to address this problem. It is sufficient to note that continuous progressive reduction in journey times should be a central goal of major rail investments and projects.

9.5 Preparation for the Implementation of “Medium-Fast” and - Subsequently - High Speed Rail

While Australia has been among the slowest of advanced nations in adopting high-speed rail technology, Victoria has invested through the Regional Fast Rail project and the Regional Rail Link project in faster and more reliable regional passenger services, with attendant growth in patronage.

There is continued scope for the present 160km/h maximum speed (which is only attainable in certain parts of the network) to be extended more widely through improvements in track alignment, signalling, duplication, level crossing active protection and the provision of long crossing loops.

As well, planning should occur to raise the 160km/h limit to 200-220km/h where this is reasonably attainable. We have referred to this as “Medium-Fast Rail” (MFR) to avoid confusion with true high-speed rail.

However there is no doubt that High Speed Rail technology will reach Australia in the next two decades and should be taken into account in planning the Victorian regional network now, and in reserving appropriate corridors.

Key reasons why this technology will come include dramatic reductions in cost as the technology matures and China becomes a bidder for high speed rail construction projects beyond its borders. The Melbourne-Canberra-Sydney-Brisbane High Speed Rail project that was estimated to cost $114 billion only five years ago has recently been costed by Aurecon
consultants for the ARA at $63 billion. This lower cost is corroborated by the recent Chinese bid to construct a 210 kilometre High Speed Rail project for Mexico for US$3.75 billion (little more than the cost of the Regional Rail Link in Melbourne). 85% of the project was to have been financed by the Export-Import Bank of China. The project would have involved 300km/h trains, a 58-minute journey time, the removal of 18,000 cars from the road and the shelving of freeway widening plans. Although this contract has since been withdrawn, the order of cost is indicative of the rapidly reducing cost per kilometre of high speed rail construction.

A considerably more modest 200km/h “Medium-Fast Rail” project in Victoria could bring cities such as Benalla, Bendigo or Ararat closer to the Melbourne CBD in journey time than Frankston or Dandenong.

It is now vital that the Commonwealth Government establish engineering standards for national high speed rail projects as to grades, curves, cant angles, noise and environmental emissions etc, so that indecision in Canberra and Sydney does not impede rail planning in Victoria.

9.6 A Rail Link Must be Provided to Tullamarine Airport

This will be a costly project and should be developed to engineering standards that are consistent with a future high-speed rail network. As argued elsewhere in this paper, this link needs to be integral with the developed Victorian regional passenger network, and the location of the airport lends itself to a *Medium-High speed* speed railway from the CBD to the airport, connecting northwards to the Bendigo line at Clarkefield and to the north east railway (assuming this is the corridor to be used by the Canberra/Sydney fast rail) near Wallan.

From a regional perspective, the connection to the Bendigo line will provide a Northern Rail Link, allowing regional passenger trains from Bendigo to avoid being impeded by suburban trains between Sunbury and Sunshine, as well as providing extra paths on the existing Regional Rail Link for heavy traffic from Geelong and Ballarat. The corridor to the north-east line should be protected as soon as the route for the Sydney high speed train is determined and Victoria needs to pressure the Commonwealth for a resolution of this issue before peri-urban encroachment prevents protection of the required corridors.

9.7 Planning for the Growth of Greater Geelong

Planning must be undertaken for the needs of Greater Geelong, the population of which is likely to reach 400-500,000 by mid-century. By that time, there will be a need for a direct High Speed Link from Geelong via Avalon Airport to the CBD, likely involving a tunnel from the Newport area to Fishermens Bend, as described elsewhere in this paper. This will ultimately permit medium-fast trains from Waurn Ponds to proceed via both Airports to destinations such as Bendigo and Albury and vice versa, integrating the airport network and...
providing access to it and the CBD to many communities. The cost of these connections can be spread over several decades provided an over-arching plan exists.

9.8 **Melbourne to Wagga Wagga**

It is worth noting that much of Victoria and the Riverina is flat terrain. Once the standards for national high-speed rail development are adopted, implementation of a section of the Melbourne-Brisbane line from Melbourne to Wagga Wagga will be among the easier components of the project as the terrain is relatively flat and there are few dense urban settlements to avoid unlike in the Sydney basin, southern highlands and north coast of NSW. If Victoria continues its leadership in higher speed rail, as it should, a higher speed journey from Melbourne to Wagga Wagga could be an early component of the national high speed rail system just as the Melbourne to Albury section was during several phases of past rail development.

9.9 **Other Improvements - Region by Region, Line by Line**

In addition to the strategic, high-level infrastructure and service improvements outlined above, there are a range of smaller improvements to regional passenger rail services in specific regions, towns and cities; and infrastructure improvements along each rail corridor.

In this regard, Appendix B contains a summary of cities and towns identified for growth under each of Victoria’s eight Regional Growth Plans and identifies potential rail passenger service enhancements and opportunities. These include:

- Additional rail stations within the larger regional cities.
- Cross-regional passenger rail connections between regional centres.
- Increased service frequencies on many lines.
- Potential future lines to serve growth areas in the larger regional cites.
- Re-introduction of passenger rail services to selected regional cities, such as Horsham and Mildura.
- Consideration of Melbourne to Adelaide rail services.

9.10 **“Commuter Belt” Towns Currently Without Rail Service**

A re-consideration may be needed of how services are to be provided to small towns within 100km radius of Melbourne but beyond the suburban network. There are many smaller towns in this radius that possess urban infrastructure including schools, childcare, doctors, shopping centres that are currently on the rail network but are not served (examples include Bannockburn, Gordon, Bungaree), as well as areas near existing settlements that could be served and developed.
A further category is towns such as Korumburra and Leongatha (once served by rail but where lines have closed) that are well developed and identified for growth in the Regional Growth Plans.
Appendix A
Victoria’s Eight Regional Growth Plans: Implications and Opportunities for Passenger Rail

Based on the eight regions defined by the State Government’s Regional Growth Plans, the key population growth locations are summarised and some potential passenger rail implications and opportunities listed for consideration. This information will help inform decisions for new and improved passenger rail infrastructure and services.

Central Highlands

- Ballarat is main focus of growth, with secondary centres at Bacchus Marsh, Ballan (both designated Plan Melbourne growth centres), Ararat, Smythesdale and Creswick.
- Urban growth south of Ballarat is directed to Smythesdale.

Potential Passenger Rail Issues and Opportunities:

- Potential new rail station near Warrenheip to cater for Ballarat East growth.
- Ballarat to Geelong passenger rail service.
- Increased service frequency Ballarat to Maryborough (currently one train per day in each direction is wasteful under-utilisation of recent investment in re-opening the service).
- Potential for light rail to serve greater Ballarat urban area.
- Given the problem of Ballarat trains being overloaded with Bacchus Marsh passengers, should the Ballarat line be electrified to Bacchus Marsh as a metro service or continue to be served by V/Line?
- Potential to re-open former Skipton-Ballarat line to service Ballarat south urban growth?

G21 Geelong

- Main growth centre is Geelong, supplemented by “planned growth” at Bannockburn, Colac, Winchelsea, Lara, Armstrong Creek and Torquay.
Potential Passenger Rail Issues and Opportunities:

- Ballarat to Geelong passenger rail service, including re-opening Bannockburn station.
- Extra rail services between Geelong, Colac and Winchelsea.
- Potential rail link to Torquay and Armstrong Creek?
- Potential for light rail to serve the Geelong urban area.

Gippsland

- Major growth locations are Warragul, Moe/Morwell/Traralgon, Sale, Bairnsdale, Wonthaggi and Leongatha.

Potential Passenger Rail Issues and Opportunities:

- Leongatha and Wonthaggi are no longer served by operating rail lines but are “designated growth centres in Plan Melbourne” (as are Broadford, Ballan, Gisborne, Kilmore and Seymour). Careful consideration of transport links requires attention, given the current “policy disconnect” which gives growth centre status without a rail connection.
- Track capacity and delays between Pakenham and Melbourne create problems for Gippsland line services and discourage growth potential along the corridor – urgent need for quadruplication or alternative new route.

Great South Coast

- Major growth is to be directed to Warrnambool.
- Medium growth directed to Dunkeld, Hamilton, Heywood, Portland, Port Fairy, Koroit, Allansford, Mortlake, Terang, Camperdown, Cobden, Timboon and Port Campbell.

Potential Passenger Rail Issues and Opportunities:

- The 13 “major growth” centres are a mixed grouping with no clear hierarchy. For example, growth potential for Hamilton and Portland is significantly greater than Dunkeld or Timboon.
- Hamilton and Portland are capable of urban growth and could have passenger rail service restored. Re-instatement of passenger trains would be relatively easy if justified by potential demand, utilising standard gauge VLocity trains connecting at Ararat with the existing broad gauge service to Melbourne via Ballarat.
- Warrnambool rail passenger service frequency is unchanged from the 1980s and requires upgrading.

**Hume**

- Wodonga and Shepparton are the designated major growth centres.
- Benalla and Wangaratta are designated for “medium to high growth”.
- Seymour is a “significant change location”.
- Broadford and Kilmore are designated Plan Melbourne growth centres.
- In the Goulburn Valley sub-region, moderate growth is planned for Nagambie, Euroa, Tatura, Nathalia, Numurkah, Cobram and Yarrawonga.

*Potential Passenger Rail Issues and Opportunities:*

- Passenger rail services on the Albury corridor are notoriously unreliable and frequency is largely unchanged since the 1980s.
- Potential Melbourne-Sydney high-speed rail corridor would traverse this region, with “game changing” consequences for regional city development pattern.
- Extend V/Line Albury services to Wagga Wagga to capitalise on patronage potential and recognise southern NSW “community of interest” with Victoria.
- Shepparton passenger rail service frequency poor compared to RFR lines given the city’s size.
- Goulburn Valley towns designated for “moderate growth” are all on rail lines except for Nathalia and Cobram; and could be investigated for potential passenger services.
- Potential for passenger rail to Yarrawonga to grow tourism market?

**Loddon Mallee North**

- Echuca, Swan Hill and Mildura are the three designated major growth centres.
- Kerang and Robinvale to “support medium scale growth”.

*Potential Passenger Rail Issues and Opportunities:*

- Restoring passenger rail services to Mildura is the most significant issue in this region.
- Mildura as a designated major centre for the region and one of the 10 *regional cities* designed by State Policy, justifies a passenger rail service.

- Economic and community synergies between Mildura and Swan Hill may add weight to a Swan Hill - Mildura passenger rail route option.

- Echuca passenger rail service frequency justifies improvement from both commuting and tourism viewpoints - currently only one return train per day.

**Loddon Mallee South**

- Bendigo is the major centre for growth, being the dominant city.

- Policy is to “manage and support growth” in Maryborough, Castlemaine, Kyneton and Gisborne. (Gisborne is a *Plan Melbourne designated growth town*.)

**Potential Passenger Rail Issues and Opportunities:**

- All designated centres are well served by rail except Maryborough (current one train per day in each direction to Ballarat is wasteful under-utilisation of recent investment in re-opening service).

- Potential to re-open Maryborough-Castlemaine line to complete Geelong-Ballarat-Bendigo route.

- Potential for light rail to serve Bendigo urban area.

- “Metro” rail service in Bendigo currently being investigated, using existing lines and stations.

**Wimmera Southern Mallee**

- Horsham is the designated major growth centre and “regional capital”.

- Designated “district towns” are Stawell, Nhill, Warracknabeal, Hopetoun, Edenhope and St Arnaud.

**Potential Passenger Rail Issues and Opportunities:**

- Horsham’s *regional city* status and role justifies reinstatement of passenger rail service, which would also serve Stawell. It is the “capital of Western Victoria” and located on the main interstate rail line to Adelaide. Until the early 1990s it enjoyed three passenger services daily in each direction including the *Overland* to Adelaide. At least three options exist, two of which could be implemented relatively easily:
- A standard gauge VLocity service from Horsham to Ararat, connecting with the broad gauge service to Melbourne via Ballarat.

- A standard gauge VLocity service from Horsham to Melbourne via Ararat, Cressy and Geelong.

- A potentially better option with greater passenger and revenue potential is to run a standard gauge VLocity (or upgraded version) service from Melbourne to Adelaide via Geelong, Cressy, Ararat, Horsham, and Tailem Bend. This is a potential business opportunity for V/Line, given the impending cessation of the current Overland train. Inter-capital passenger traffic would help recoup the cost of serving the less populated western Victoria region, but would require negotiations with the SA Government.
Appendix B
Drivers of Demand:
*Forecasting Future Regional Rail Patronage and Impacts on Population Distribution*

With the available data and research, the impacts of improved rail services on population and business growth and distribution can only be estimated within wide confidence levels.

The potential effects can only be described and perhaps given an order of magnitude value because the demographic and travel pattern changes observed or predicted - particularly the longer term changes - are the result of a wide range of interacting factors, some of which are unrelated to transport.

Nevertheless, broad estimates of these impacts can be made based on available information and within constraints of for a particular project.

*However overseas experience (particularly the European experience with higher speeds) confirms that quality medium-fast rail service, when combined with implementation of other inducements, is a good tool for regional integration and economic development and very effective in shaping land use into a more sustainable form.*

**Forecasting for the Regional Fast Rail Project**

In an attempt to deduce the population redistribution effects of improved rail services to regions in Victoria during the Regional Fast Rail (RFR) feasibility studies, attempts were made to determine the locational changes Melbourne residents might make if regional areas had improved rail access to Melbourne. Two methods were used:

- Using experience elsewhere whereby the results of changing services are monitored and applied to the case under consideration. (This can also be termed the “revealed outcome” method.)

- Asking passengers how they may behave, whereby passengers respond to the service initiative as described to them and state an intention to behave accordingly. (This can be termed the “stated intention” method.)

Both approaches have problems: Revealed outcomes are not always well documented and it can be difficult to isolate the impact of a single factor; and Stated intentions are often not translated into actual behaviour.
Therefore during the *Regional Fast Rail (RFR)* feasibility studies, three alternate methods were used by consultants to predict population change for the RFR Corridors:

a) By interviewing 400 Melbourne workers to determine the likelihood that they would move to regional areas if their daily commute to work took no longer than their present journey;

b) By comparing past population growth rates by travel time to Melbourne, applying higher rates further from Melbourne where fast rail would significantly reduce travel times; and

c) By looking at the relationships between travel times to Melbourne and forecast population growth.

The consultants made it clear that improved rail services are but one factor in determining population growth and redistribution. Actual patronage growth would fall in a wide range depending on the complementary actions occurring at the same time as improved rail services.

Despite some controversy over the exact relationships between rail improvements and population growth, it is indisputable that patronage on V/Line services has experienced significant growth following major service improvements, such as the RFR project, with actual patronage exceeding even the most optimistic predictions.

*Understanding the Various Components of Patronage*

A greater understanding of this patronage growth can be revealed by understanding the components of patronage and the relationship of land use and travel in each component.

Three key components of patronage are:

1. **Trip diversion**
   - *Passengers change mode of travel*, usually from car to rail. While *trip diversion does not increase the total the quantum of travel* made, rail patronage has increased its mode share because of the improved competitive position of rail travel, in terms of travel times, frequency and service quality, when compared to car travel. Population and employment distribution does not significantly affect the combined total amount of trips by all modes, but can influence the share of travel by each mode.

2. **Trip Generation**
   - *Here the quantum of travel increases* as new trips are created by changes to rail services. For example, extensions to rail service to new towns or suburbs, beyond Geelong, Ballarat and Bendigo or reductions in travel times may make additional shopping or leisure trip activity more attractive. Population does not change but more people have easy access to rail services
3. **Trip Redistribution**

Here the origin and destination changes. For example changes in rail services may encourage a trip to the Melbourne CBD rather than locally. More commonly, trip redistribution is associated with a traveller deciding to relocate. There is considerable evidence of Melbourne commuters relocating to areas once considered outside but now considered within commuting distance of the central area. Relocation of employment and educational institutions also influence trip redistribution.

Trip redistribution is usually a longer-term effect than trip diversion or generation, as it usually associated with relocation of population, employment or educational facilities. This mainly occurs when the perceptions of rail accessibility to major attractions is significantly improved such as has happened with the Regional Fast Rail, where outer metropolitan areas and some regional towns once considered too distant from CBD are now perceived to be within commuting distance. Trip redistribution also occurs when major attractions are relocated to regional centres served by good transport links. This may be achieved through market forces or by deliberate Government planning actions.

V/Line patronage has doubled over the last decade and by 8% in the last year due to combination of the above effects. The patronage increase has exceeded even the most optimistic predictions made during the RFR Feasibility study.

**Current Techniques for Forecasting Rail Patronage**

Patronage change from trip diversions, generation and redistribution can be predicted using models based on sensitivities or other established relationships.

The models are usually calibrated on historical relationships. The models operate by application of the nominated factor or parameter to the change in each of a number of key independent variables and summing the contribution of each factor to generate the expected change for each forecast year. The factor usually takes the form of *elasticity*.

The development of models has greatly increased knowledge of determinants of current travel patterns and assisted in forecasting. However, all the current models have limitations as tools to predict the land use changes resulting from improved transport links. These demographic changes induce further patronage growth.

Undoubtedly other factors influence demand, including environmental concerns, the quality of trains (eg: the introduction of Sprinter trains in the 1990s and VLocieties from the mid 2000’s), customer attitudes, levels of tourism, number of special events, economic growth, introduction of new services (such as extensions of rail services beyond Geelong, Ballarat and Bendigo to the outskirts of these cities) but these factors cannot be readily incorporated into the models.
The most sophisticated forecasting models currently available attempt to model and predict travel demand at a *disaggregated zonal level*. Typically these models simulate current travel by all modes of transport undertaken by households, firms and visitors to and from a region during a typical weekday in each forecast year. Given a scenario of land use and demographic change, the models reflect the level of participation in a range of activities across a region and the frequency of travel to them as well as the choice of destination, mode and route.

A limitation of these sophisticated models is the requirement for a lot of detailed disaggregated data about current relationships and predictions for the future at the same level of detail.

Less sophisticated models produce forecasts for regional public transport usage at a high level and are particularly suited to making rapid broad scale assessment of the transport implications of changes in demographic projections, economic conditions, service level changes and attitudinal factors. These models attempt to predict future patronage based on comparing the actual patronage change observed in recent years with changes in key factors such as population, central Melbourne employment, fuel prices, traffic congestion, service quality and fares. The deficiency with these broad-brush models is they lack explanatory power.

From the modelling work and other market research, the sensitivity (elasticity) of demand to various aspects of rail services is usually measured in terms of *travel elasticities*. These represent the change in demand that results from a given change in service. They are usually expressed as proportional changes (eg: If train frequency increases from one train per hour to two per hour - an increase of 100% - and there is an increase in patronage of 60% as a result, the elasticity is 0.6.)

Elasticities are usually applied to predict patronage impacts in different segments of the travel market, fuel, fares, service quality and travel times as shown in Table 1 below. The elasticity is in each geographical segment and time period (for the Commuter zone).

**Patronage change = Elasticity* Change in Factor*patronage**

The table shows estimates of elasticities for changes in rail patronage for regional areas (ie: beyond commuting distance of Melbourne) for journeys within the Commuting area.

<table>
<thead>
<tr>
<th></th>
<th>Regional Areas</th>
<th>AM Peak Commuter</th>
<th>PM Peak commuter</th>
<th>Non Peak commuter</th>
<th>Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.3</td>
</tr>
<tr>
<td>Fuel</td>
<td>0.40</td>
<td>0.30</td>
<td>0.30</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td>Fares</td>
<td>0.40</td>
<td>0.20</td>
<td>0.20</td>
<td>0.35</td>
<td>0.30</td>
</tr>
<tr>
<td>Quality</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.5</td>
<td>0.50</td>
</tr>
<tr>
<td>Travel Time</td>
<td>1.2</td>
<td>0.60</td>
<td>0.60</td>
<td>0.8</td>
<td>0.50</td>
</tr>
</tbody>
</table>

A positive value suggests demand will increase as the quantum of services feature increases.
Elasticity can also be negative. For example a fare increase will result in a decrease in demand.

From the evidence, travel time elasticities can be concluded as follows:

- Commuter areas in vehicle: travel times elasticities range between -0.3 and -0.7 with much variation between peak and off peak. Values for regional services are generally higher in the range -0.4 and -1.1
- Commuters are more sensitive to small changes in travel times than regional services.
- Substantial journey time reductions and greater service frequencies are required to attract substantial increased in patronage.

**Key Factors in Car-to-Rail Trip Diversion**

**In Commuter Markets:**

In commuter markets for diversion of travel from car to rail, trains must be competitive with the comfort of the door-to-door convenience of the private car, especially as many employees have costs of car travel covered by employers. Frequency of services is particularly important.

Opportunities to increase patronage from *trip generation* in the commuter markets are low, since it is difficult to travel to work more than once. However increasing patronage by trip *distribution* is relatively more important for commuter markets than for others. Although overall redistribution is not thought to be a large part of growth in the short term, it is significant in the longer term especially if rail improvements are undertaken as part of a set of policies and actions to influence locational decision-making.

**Business Travellers:**

Business travellers attach a high value to time and hence place great value on reductions in travel time. However opportunities for redistribution of business travel are limited, since trip ends are determined by business needs rather than travel alternatives. Also opportunities to generate new business travel are low, since most business needs do not increase because travel is quicker. Diversion from car is thought to have medium potential from business markets, because typically business travellers have a higher car mode share and much potential for rail use, but at the same time business travellers value the benefits of cars highly.

**Personal Business and Leisure Travellers:**

Personal business and leisure travellers are generally more sensitive to fare costs and value travel time less. Trip redistribution potential is much higher for leisure markets, since a choice of destination is determined by cost, although travel time is not usually a significant
issue. Opportunities for all types of growth are high for the leisure market, due to the greatest opportunities to create new trips and to compete with alternative leisure locations with cheaper transport packages. Potential for trip diversion is high due to the cost sensitivity of leisure markets, although in Victoria these markets have a high car mode share due to the need for a car to access the spread-out patterns of venues in regional centres.

**Emerging Phenomena Likely to Influence Rail Demand: The “Peak Car” Factor**

There is emerging evidence that individual car use, as measured by the average annual distance travelled, has ceased to grow in most of the developed economies, starting well before the recent recession. In some countries it may already be declining - a phenomenon known as “peak car”.

A number of factors could contribute to this trend. Suggestions have included a decline in younger people holding driving licences, changes to company car taxation and technological constraints that stop us travelling faster on roads. And it may be we have simply sufficient daily travel to meet our needs.

There has also been a shift away from car use in urban areas. This could be particularly important in a world where future population growth will be mainly urban and densely populated cities are seen as a driver for economic growth.

Rail offers speedy and reliable travel for work journeys compared with the car on congested roads. This gets business and professional people out of their cars, which makes the city a less congested and more agreeable place to be.

This phenomenon of peak car in big cities is not unique to London, although this is the city for which the best data is available. There is evidence for something similar happening in Birmingham, Manchester and other British cities as well as those in other developed countries.

The shift in economies from manufacturing to services is an important driver, as is the growth of higher education located in city centres, attracting young people for whom the car is not part of their lifestyle.

If car use really has peaked, both in the sense of national per capita figures and the share of trips in cities, it should help mitigate greenhouse gas emissions from transport. It is estimated that these changes in behaviour, taken together with expected developments of low-emission vehicles, could by 2050 reduce UK surface transport greenhouse gas emissions by 60% compared with 1990. This falls short of the overall target of an 80% reduction, but is a good deal better than conventional projections.

“Peak car” is not just an emerging phenomenon to be investigated. It is a helpful trend to be encouraged, to achieve both successful, sustainable cities and national reduction of transport greenhouse gas emissions.

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*Victorian Regional Passenger Rail 2050: Growing Victoria’s regional passenger rail services and their role in the growth and sustainability of regional Victoria.*

Rail Futures Institute Paper for the Australian Regional Development Conference - August 2015

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Plan to Empower Our People
Global Brand Disciplines
Redefining the Future of Regional Australia

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Paper Submitted for Publication at the
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Plan to Empower Your People
Redefine the Future of Regional Australia
Using Global Brand Disciplines

**HELICOPTER VIEW**

Regional Australia: built reputation as adaptive, resilient, innovative people
+ 
Global Brand Disciplines
= 
Plan to engage our people & assets in the solutions:
Redefined beyond the commodity mentality:
AIM: Towards Excellence! Imagination: Resilience: Determination: Diversity: Reinvestment:
Jobs: Vital, Engaged Communities

**The Problem:** The risk of not undertaking this process is far reaching.
Slower growth or just decline, lack of investment, decisions made outside the region, and at its worst economic death, fractured communities and no jobs for our children in the region.

“It takes a village to raise a child” *(Hillary Clinton)*

**The Solution:** Empower regions to generate, develop and invest in innovative ideas & sustainable, adaptive systems in: business, agriculture, education, tourism, creative expression, community events etc. Best realised in communities where people feel safe to express themselves and are heard.

Maslow’s Hierarchy of needs
Identify regional resources: government; community; funding initiatives; mentoring; research; education; activities; social and physical infrastructure.

**Regional Vision & Shared Values:** What differentiates? What’s on offer?

Competitiveness: Price: Distribution: Promotion: Communication:

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ABSTRACT: To redefine the future of regional Australia means we acknowledge our reputation as an adaptive, resilient and innovative people was developed in our regions, providing products and services of integrity and quality. This did not happen by chance. The issue is how we redefine our regions as leaders again, ensure our people fully participate in the process, and share the benefits of skilled jobs, wealth creation, reinvestment and participation in vital, integrated communities.

Rather than take a piecemeal approach to planning in our regions, this paper recommends we take a helicopter view of the principles on which communities develop to meet people’s needs, and consider how global brand disciplines applied to regional Australia can sustain their capacity to adapt and grow. It highlights our current commodity mentality limits our capacity to benefit fully from regional production and to nurture engaged communities.

However, it applies a caveat in how global brands rules differ. They are not bound by place, are controlled off shore and act in their own interests as a priority. They take a long term view rather than short term expediency. Decisions are highly centralised. We have much to learn from them.

The risks of not undertaking this process are far reaching in slower growth or decline, lack of reinvestment in wealth creating assets and limited opportunities for skilled jobs for the regions.

Desired outcomes from this process should include: revitalised communities with a sense of belonging and purpose; restored trust that decisions made reflect shared community values and regional interests; greater engagement in the productive (skilled, secure jobs) and creative process (innovation in business, arts and community activities). Renewed confidence that our future is invigorated by empowering our people to own, embrace and drive change, are resilient and determined, and ensure Australia benefits from the reputation our people have built as they think and act local in a global environment.

Key words: develop strategic regional plans; apply global brand disciplines; engage our people in the solutions; reinvigorate communities; tell our stories.
Introduction

The current downturn in the national and global economy provides a window of opportunity for regions to plan your future and engage your people in the process. This discussion explores the extent to which we benefit from the investment by regions over the past two centuries, and addresses how we can manage the concept of a national brand – Australia, supported by the sub brand plans in regions.

It highlights that these plans are about more than economic solutions. They are about the values that define regional communities as places where resilience, determination and imagination can redefine their future. The best outcomes require that all sides have opportunities to contribute, to be heard and not just be passive recipients. The question is: can we find new ways of listening to and supporting each other in the regions?

Hilary Clinton quoted an African proverb “it takes a village – to raise a child” to highlight the responsibilities of the family and of the broader community to nurture values, and provide opportunities for people to participate in and contribute to their community no matter what their capacity. The current focus on Australian regions recognises the contribution our “villages” make. The challenge is to engage your people in the process.

How did regions build Australia’s reputation?

Australia owes much of our wealth and our reputation of quality and integrity to regional Australia. Consider the innovations in agriculture and science that Australians produced in the first 150 years of settlement and subsequently. They were determined to make a difference. This did not happen by chance. It was cultivated by people who were adaptive, resilient and innovative, despite the scourges of distance and drought. They took risks to solve problems, explore opportunities, create wealth, and reinvest in skilled jobs here. They found expression through sports, creative arts and interest groups. They built and nurtured communities, creating a sense of belonging, of place and of purpose.

Imagination, cooperation and hard work got us this far, but it is not enough to wish this in an increasingly competitive and predatory environment. The current concerns reflect that in recent decades, as a nation, decisions have been geared to a 3-4 year electoral cycle and this is reflected in how we manage our reputation and engage our people. Plans that may be in place
at the national, State or regional level are an exercise for a few and appear to be rarely referenced. Where the stakeholders are excluded, expedient solutions lead to poor outcomes.

This paper addresses those who can contribute to this conversation. It is based on experience in the market place over several decades in business, developing and promoting national and local brands here and off shore, and engaging widely across communities.

The following discussion explores ways of thinking with open minds.

“Clarity of mind means clarity of passion, too; this is why a great and clear mind loves ardently and sees distinctly what it loves.” Blaise Pascal (1623 - 1662)

“Whosoever desires constant success must change his conduct with the times.” Niccolo Machiavelli 1532

Changing your conduct with the times and looking at your organisations from another perspective, requires a marketing approach, that is, to know how others see you and to understand what benefits you offer.

*Why plan?*

Rather than take a piecemeal, short term approach to planning in your regions, this paper takes a helicopter view of the disciplines required to engage your people and your assets in the solutions you need to find. While this conversation has been long overdue, the opportunity in the current climate is that you are open to find solutions, to lead and embrace change.

To succeed you must ensure that you provide opportunities through multiple “conversations” for your people to fully participate in the process of redefinition, take ownership of the change, and reap rewards of reinvestment in the social, cultural, learning, environmental and economic outcomes.

These conversations should include community leaders, influencers, organisations, community groups, local businesses, the under 30s with ideas, and schools to imagine how they can each contribute. Large businesses, experts and all levels of Government are part of the process that may or may not be associated with the region, but can help facilitate change.
Brand disciplines, when applied, can then form the foundation of shared visions as an integrated strategic plan or sub brand of the parent brand – Australia.

*Will global brand models reinvigorate your regions?*

Global brand disciplines highlight how they make decisions and manage assets. However, regions need to apply a caveat in how these are interpreted in the regional interest.

However, global brands are not responsible for communities even though they may provide opportunities for participation in a productive skilled workforce, the supply chain, and support local initiatives as “good corporate citizens”. Their loyalty is first to themselves and not the community. Operating in a competitive trading environment here and elsewhere, they change locations to suit their business’ needs. In recent years many brands that once represented Australian interests here and off shore are now managed and/or made off shore, and sell back to Australia. Therefore, Australia no longer benefits from or manages our reputation.

Note, brand disciplines are not exclusive to global brands. Many successful Australian brands e.g. businesses –Bega, Akubra were initiated in the regions, and more recently regional businesses, One Harvest incorporating VegCo, continue to reflect these same disciplines. They think and act local, and if successful form the foundations to operate in a global market place. Relatively to the global market place these are small businesses. They do however highlight the opportunity for regions to develop and build local brands and thereby create reinvest in greater opportunity for the region.

### A. The Way Forward

*How do you engage your regions in the process of regeneration, owning the future for your people?*

In recent decades we have focused on a narrow range of solutions proffered by observers here or elsewhere who are not necessarily accountable for the decisions or the outcomes. If you think this is just about economics you limit the opportunities. This is about your people in your regions. This is an opportunity to unlock the wisdom of those in your villages, and to
build the foundations of integrated and vital communities. Ideally, these conversations will encourage broad and active discussion and participation in the outcomes.

*How do you go about this?*

This process should take people outside their comfort zone.

Focus on the centre of agreed values, and take a 360 degree perspective to understand how others perceive the situation and how each can participate.

Imagine in the centre are the agreed values of a civil, engaged, regional society that nurtures respect, loyalty in diversity, and provides equal opportunities for people to be the best they are capable of being. These are the principles we espouse as a democracy, the seeds of which were initiated over 2500 years ago in Ancient Greece, and developed further in the Age of Enlightenment as referenced earlier. Around the parameter we stand with different opinions, all of which have the opportunity to be heard and be considered from others’ perspectives.

*Why do we all need to have this conversation?*

Regions are critically important to Australia’s future. The dis-ease in our communities is not just economic, it is about the loss of identity, shared purpose, focus and opportunities to contribute to our future. We have failed to nurture a regional environment that reflects the values and principles on which Australia was founded. Our laissez faire approach has been noble and worth preserving, however with rights go responsibilities. These can be hidden in our city centric chatter.

Based on recent reports, regions have urgent work to do. In 2012 Regional Australia represented around one third of our national economy, 67% of our export earnings (skewed somewhat by mining), and around 45% of our tourism income. Regional populations grew by 6.6% between 2007 and 2012 and are expected to grow by a further 20% by 2026 (http://www.run.edu.au/cb_pages/regional_australia.php).
We cannot expect to impose change on your regions unless you are encouraged to embrace change and look forward. This means you must provide the means for your people to explore, contribute to and realise ideas. Open, inclusive discussion at the regional level can empower people to find and take ownership of the solutions, and encourage them to embrace the theme “if it is be, it is up to me”.

**How do we encourage your people in regions to aspire?**

Maslow’s hierarchy is a useful starting point as it highlights basic needs are best met in a family and a narrow group in a community. Higher needs are nurtured where people find expression in their contribution to the wider community, where they have opportunities for creative expression and inclusive group activities such as sport, voluntary community groups and service organisations, or other ways people meet their higher needs in vital communities. These are developed through education and training, and nurtured through recognition and regional opportunities.

![Maslow’s Hierarchy of Needs](http://www.simplypsychology.org/maslow.html)

Regions have the capacity to generate, develop and reinvest in innovative ideas in business, agriculture, education, tourism, creative expression, community events. This is best communicated within a communities where people feel safe to express themselves.

At the regional level these are supported with access to efficient infrastructure, investment, skilled secure jobs, and engaged communities.

Recognition and support for individual or group initiatives to build sustainable, viable communities are thwarted without appropriate long term strategic planning.
The problem is that while we retain a city based, economic focused, commodity mentality, we cede the benefits of diversity and innovation that could be multiplied within your communities. A narrow, short term, defensive focus impedes your resilience and ability to adapt. Global brands are not so naïve.

Regional plans need to encourage your people be the thinkers, creators, innovators, decision makers and doers. No one and no group has the answers.

Diversity imbeds resilience and a capacity to adapt across regions.

*How is Australia perceived and how do your regions perceive themselves?*

To the rest of the world Australia represents a clean, green growing environment, rich in resources, relatively affluent, growing population and stable governments. These are not enough if we are not managing the change.

Regions have opportunities to confidently redefine your own future based on trust, shared values, respect and knowledge you have the capacity to be a productive, innovative and clever. Success is measured in integrated engaged communities that nurture a sense of belonging, secure skilled jobs, support local initiatives, and create wealth which is reinvested in business and community assets.

This process of engagement needs to redefine regions aim “towards excellence”. Regions are more than the sum of the parts.

*How do regions go about this process of reflection and imagining the possibilities?*

It is not the purpose of this paper to define these opportunities. No one and no group has the answers. The advantage of regional plans is the stakeholders ideally have greater input and responsibility for the outcomes.

Inclusiveness is a strength if based on agreed core values and disciplines. Planning with stakeholders in the change needs to follow a process, and not by accident or good fortune.

A number of State-wide planning models have been instituted over many years that review, adapt and grow beyond the political cycle. For example, the South Australian Plan has a component called Food SA. It embraces agriculture in the broader context and supports innovations in manufacturing, tourism. It was developed by a process of community
involvement and participation. It is regularly reviewed. All the stakeholders in this process need to “buy in” and include small, medium and large size business, farm owners, workers and their representatives, all levels of government, community groups, researchers, financers, educators and trainers.

These plans do not help them retain major industries such as the car industry when those decisions are made off shore or at the national level, but they do help identify medium and long term opportunities that imbed resilience in dynamic communities such as food manufacturing, tourism, high end engineering and potential new industries that imbed resilience in dynamic communities. The planning process allows them to listen widely to their people and take appropriate action.

A further example is Gloucester in NSW that provides an example of local initiative targeting niche businesses, largely based on engineering, several of which relocated from the Newcastle when BHP reduced its presence. These businesses are clustered in an industrial area established by the local council and Chamber of Commerce. Some of these businesses export. The benefits to them are lower business costs for their high end products, and lower housing costs for owners and their skilled workforce. Mining and agriculture share the land, although mining does not bring permanent residents. Successful farms are producing high end beef exports and boutique wines. The vitality of the community is evident in the quality of art local high school students exhibited, the choice of cafes and local stores. This is a community that has planned to excel even before the recent mining of coal seam gas.

B. Observing Global Brands

What can we learn from global brands?

Branding may seem like a recent phenomenon in the business and consumer market place, but they have been with us for thousands of years as national identities, cultures, religions; each of which focus on shared values and principles that guide and find expression through their adherents.

Successful brands are highly sophisticated concepts. If you extrapolate brand disciplines to a regional conversation, your people and our institutions, then your decision making and the outcomes would be much more efficient and effective in the short and long
term. However, to reiterate the caveat: global brands operate outside the boundaries of national interest, unless the brand is controlled by a government.

Below is what global brands do. Regions can employ the same processes to build regional brands and communities. Global Brands are not just about the transfer of tangible goods or services. Global brands:

i. reflect a brand’s values and principles in every aspect of an organisation’s operations,
ii. make decisions based on their own needs,
iii. appear adaptive to the local market place,
iv. use sophisticated systems to measure short and long term implications of decisions,
v. reviews of competitors’ activities are ongoing,
vi. use profits to take over competitors,
vii. vehemently protect their intellectual property rights,
viii. communicate disciplined corporate messages to build consumer / client trust/ policy favour using advertising, PR, social media, influencers and lobbying,
ix. measure success by growth of markets, profits, and longevity.

However, global brands are not the same as regional communities:

i. their first responsibility is to the company and the shareholders, not the place where they operate,
ii. their decision making is highly centralised,
iii. the people who run the companies have vested interest as major shareholders,
iv. manage their assets across political regimes and economies in the international environment,
v. lobby actively for their own interests,
vi. transfer funds across countries,
vii. takeover local brands to limit competition or represent in local market or off shore,
viii. takeover and control key resources in the supply chain,
ix. source goods or services across countries to maximise returns,
x. do not build communities, although, if operating in communities, engage to build brand loyalty through sponsorship and brand exposure.
C. Elements of Global Brand Disciplines Applied to Regions

The following strategic brand disciplines when applied to regions as sub-brands of the national brand Australia, can be used to develop regional plans with the added value of engagement from those who will benefit most – the people and businesses in regional communities, as they embrace their roles in redefining a region, and share the rewards in wealth creation and reinvestment with a sense of place, purpose and belonging.

Based on inclusive disciplined plans, successful regional brands can actively compete, grow and prosper utilising internal disciplines and systems that adapt to the trading environment while reinforcing their values and principles in the national interest.

*Be warned:*

The risk of not undertaking this process is far reaching. Slower growth or rapid decline, lack of investment, decisions made outside the region and at its worst economic death, fractured communities and no jobs for children in the region.

*Taking action!*

“As a collaborative process: imagine the region is eating an elephant, a mouthful at a time.”

This process is about active telling and listening from a wide audience. It is about empowering positive change. Be guided by those who have been active in communities and who have successfully managed and understand global brand disciplines, and how to communicate the messages succinctly. Not all experts can take the 360 degree view. Encourage wide input from regional business and community stakeholders and experts. All should be guided.

The process should identify those regional resources that can deliver the government, business or community outcomes– funding initiatives, mentoring programmes, collective group activity, infrastructure etc. The following list can be adapted to any business or group that aims to build brand loyalty. The process should open discussion to problems and solutions to your region’s needs. Be open to new ideas.
The points below may already be addressed in your region, however use this process to engage more widely and get fresh input to problems and solutions. Note the headline points used by global brands has been applied below to a region. Ideally each of those who can make a contribution are encouraged to support and take ownership of the change in our place:

1) Positioning:
   *What makes your region different?*
   a. develop a “personality” of your region and how you would describe it to someone from interstate - examples follow;
   b. have a clear understanding of your core values / principles and vision - how you want to be perceived as a region – more than a commodity mentality – appreciate the perceived values to the people who live in the region, the people who will visit or buy the regions’ goods and services and its real worth to your families and community;
   c. reinforce these throughout the organisation/ region nurturing an internal culture to differentiate from competitors and build brand loyalty;
   d. consistency, attention to detail, disciplined high standards and pride build trust for end users in the region and beyond, and in the local supply chain by those who provide components, goods and services – it is a team effort;
   e. manage and protect our reputation through legal process and lobbying in a planned / collective way with other regions to all levels of government in Australia (global companies lobby in the countries in which they operate).

2) Planning:
   *What time frame do regions need to build a regional brand plan using the 360 degree approach?*
   a. brands have long term strategies (vision - what) and tactics (how) to achieve the desired outcomes – these regional brand plans should be achievable within 18 months to 2 years – the process itself should change alert new thinking and behaviour;
   b. if there is already a regional plan in place review it in the context of the global brand model;
c. in the meantime put systems in place that ensure wide input from stakeholders - engage all levels of the regions/organisations, and where appropriate in the supply chain in and outside the region;
d. develop systems which record and give feedback to those making contributions – businesses, communities groups etc;
e. establish systems that measure the short and long term outcomes of decisions – for example, new jobs, greater engagement in community groups, safer communities, business confidence, reinvestment, regional initiatives, recognise opportunities
f. put systems in place to explore, fund and potentially implement, and influence government policies at all levels;
g. remember short term wins help achieve momentum so attack the low hanging fruit first.

3) People:  
*Who are the people who can make this happen?*

a. identify individuals and groups that represent a wide range of interests and skills and who have the most to gain or lose;
b. define and nurture a strong regional culture that engages people to perform at their best;
c. reward and acknowledge enterprise and hard work during the planning process whether in business or community activities;
d. provide opportunities to progress within the business/ community through training and education.

4) Product or Service:  
*What does the region have to offer to build wealth, secure skilled jobs, reinvestment and support social/community needs?*

a. identify goods or services the region produces or supplies;
b. consider how these can be value added in the region’ not just sold as a commodity here or off shore;
c. consider how you can make them unique to your region, or if the market is big enough how you can source from other regions and add value;
d. consider new products or services that could provide greater returns;
e. consider what kind of businesses could manufacture in your region that you do not already have;

f. consider service businesses that could be managed within your region via the internet or on line.

5) Finance:

How do regions fund growth and reinvestment in wealth creation within integrated communities?

a. measure key parameters before the process and at key milestones;

b. aim to deliver consistent bottom line results relative to the market which for a region means businesses are viable, regional banks are viable, housing is affordable and infrastructure support efficient in transport, water and energy supplies;

c. consider investment models whereby your region retains majority control;

d. reinvest profits to grow the regional brand, incentivise work force, or build investor loyalty;

e. retain majority control of the wealth creating assets and infrastructure;

f. borrow to invest in growth or acquire competitors;

g. recognise that cost controls that devalue the brand in the market can be detrimental to long term profitability and growth of market share;

h. acquisition is often used by global brands to centralise control in a market and the source of supply, to silence competition, or to engage in activities to undermine their competitor’s reputation and brand – this approach is tempered in a region;

i. if control of key assets such as infrastructure (energy, water, transport – road, rail, ports) across regions is not controlled by local and adjacent regions, alert State and Federal governments as these add cost burdens and inefficiencies.

6) Investment:

How do regions fund investment in innovation and retain the benefits within the region?

a. identify those businesses that invest in innovation to lead change or adapt to the market – a region provides a place for small to medium sized enterprises to cluster and to test new ideas or products in a market place or share services;
b. invest in people throughout the operation – in a region through mentoring, training and education;
c. develop key partnerships in the supply chain;
d. invest in the social infrastructure through creative arts, shared interest etc.
e. reinvest in growth – consider the model of reinvestment in a region where the wealth creating assets are owned within the region potentially returning 40% more than if they were controlled outside the region

The diagram above is a study done by Regional NSW in the past decade that shows 40% more stays in the region economy when local businesses supply the foods and services.

6) Protection:

*How do regions protect their brand from competitors?*

a. brands vehemently protect their assets against competitors;
b. secure access to the supply chain;
c. use legal processes to guard their name, image and intellectual property rights;
d. if intellectual property rights have been developed in a region potentially license these to other regions to ensure control and security of the rights by those not licensed;
e. the regions reputation is a brand asset and the benefits of that brand should be to the region.

7) Price:

*How do regional businesses price their goods or services?*
a. depends on input costs, and where the products are being sold – wholesale, direct to retail, direct export, direct to users and competitor activity;
b. consider how global brands use price competition to remove smaller competitors, and produce a wide range of products that buffer the discount on some goods or services, or volume creates greater efficiencies or suppliers discount for volume sales in the wholesale market
c. depends on where regional brands are positioned against direct competitors;
   i. high end brands are more exclusive and less price sensitive, but must deliver consistent, high perceived value – they represent lower volume;
   ii. middle and lower end brands limit their ability to improve buyer perceptions of value or aspiration, and the market is more crowded in the lower end especially from import substitutes – however they potentially represent higher volume sales;
d. consider whether the region is selling a commodity or goods/services that have a high perceived value of quality and integrity, sourced and made in Australia.

8) Competitiveness:

   How do regions remain competitive in a market that uses price as a benchmark?
   a. ensure internal disciplines are efficient and productive;
   b. reinvest in practices that achieve higher volumes or add greater value so price less sensitive – the region’s reputation means higher perceived value to customers;
   c. problems are anticipated and dealt with in a timely manner – for example retailers demand lower wholesale prices and advertising incentives but do not deliver the sales – be prepared to sell elsewhere where profits can be returned and good relationships developed;
   d. select key partners in the supply chain and distribution channels to maintain quality standards, supply chain security and brand reputation;
   e. invest in on-going training, and seek input from operations and sales staff to ensure efficiency in the systems and standards throughout the operations;
   f. develop systems for feedback from customers.
9) Distribution:

*How does a region deliver goods or services to customers and retain transparency in the process?*

a. need efficient rail and road links to markets, State and Federal governments are key and require consistent lobbying to achieve better results;
b. sell goods direct on line, through retail outlets, own stores etc.
c. services on-line, direct to clients or through agencies;
d. develop key partnerships for distribution off shore;
e. recognise how global brands and imports increasingly replace local brands on shelves;
f. enlist agents to sell product into stores or create clusters of local businesses that can promote in stores or online.

10) Promotion:

*How does a region show off what it offers?*

a. regions do not just sell products and services - they sell lifestyle, a vision, the dream, quality, adventure, lifestyle, sense of place, communities nurture wellbeing, promote new skills (farm experiences), relaxation, regional history tours – identify each of these values and the experiences they offer as opportunities for businesses and community to groups to service and support service businesses, to reinvest in local jobs;
b. build awareness that differentiates the region from competitors (other regions), based on product or service innovation, quality and integrity of supplier and in the local supply chain - reinforce the reputation of trust in the regional brand;
c. invest in ongoing research to identify the perceived benefits to the end users and test new ideas – focus groups, on line, social media competitions, regional and State shows;
d. build strong relationships with buyers and sellers in the supply chain and plan special promotions in which a number of businesses in the region participate and benefit;
e. develop training standards for staff in local businesses to interface with the public in tourist events and activities, direct sales etc.
f. work with other regions to actively lobby all levels of government to influence policies.
11) Communication:

How does a region communicate what it has to offer to local markets, nationally and offshore?

a. clearly identify target audiences and influencer groups;
b. manage the message and channels of communication to promote to them;
c. to become part of the national conversation, develop a communication plan that enables the region to actively manage and promote the regional brand benefits and attributes through direct advertising, and indirect communications such as social media, sponsorships as good corporate citizens, enlist high profile influencer endorsement, radio and TV media stories, plan on line promotions, develop or update a comprehensive, easy to navigate regional web site etc.
d. keep it simple, be consistent, plan and measure responses as they build – for example:

   i. global brands give us insights into how we can “Advance Australia” as we “Advance (Region)”. Based on strategic thinking, global brands use simple messages to build brand loyalty, bottom line results and to highlight their competitive advantages -for example “Oh what a feeling!”(Toyota cars), “Think Different” (Apple computers, phones), “Life’s Good” (LG home appliances), “Just do it” (Nike sports gear).

e. translated to regions the communications need to:

   i. reflect the “intent” and the ”benefits” or unique attributes the region offers,
   ii. engage widely – this is not about a top down approach;
   iii. support a flow on effect in regional business and communities;
   iv. differentiate themselves as sub brands under the umbrella of brand Australia.

Conclusion:

Important journeys start with planning and sharing. The process of redefining Australian regions opens possibilities to discover the “aha” ideas that excite our people’s imagination, and can be realised through shared vision, discipline and cooperation with help along the way.